

1 IN THE UNITED STATES DISTRICT COURT

2 FOR THE DISTRICT OF OREGON

3 PORTLAND DIVISION

4 UNITED STATES OF AMERICA,)

5 Plaintiff,)

Case No. 3:17-cr-00226-JO

6 v.)

May 23, 2018

7 W. JOSEPH ASTARITA,)

8 Defendant.)

Portland, Oregon

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12
13 EVIDENTIARY HEARING - DAY 3

14 Pages 426 - 668

15 TRANSCRIPT OF PROCEEDINGS

16 BEFORE THE HONORABLE ROBERT E. JONES

17 UNITED STATES DISTRICT COURT SENIOR JUDGE
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INDEX

EXPERT WITNESSES:

PAGE:

KEVIN TURPEN

Direct Examination by Mr. Sussman

430

Cross-Examination by Mr. Angeli

469

Redirect Examination by Mr. Sussman

506

TOBY TERPSTRA

Direct Examination by Mr. Maloney

520

Cross-Examination by Mr. Francis

568

Redirect Examination by Mr. Maloney

650

Recross-Examination by Mr. Francis

664

TRANSCRIPT OF PROCEEDINGS

(May 23, 2018)

(In open court:)

THE COURT: Good morning, everybody. Let's hope we'll have a smoother day today. Yesterday was kind of bumpy. We all -- I appreciate everybody is trying to do their best, and that's all we can ask for. My comment, though, that in the Navy we always said, "Report for duty ten minutes before the watch," so you get squared away before you come up to this Court the last way -- minute.

Today I have two sentences to do at 10:00, so we'll recess for that. They should -- they are routine matters. It shouldn't take very long.

I wanted to emphasize that we -- I had blocked off through Thursday for this case, so we're in no hurry. We have no time restraints on anybody, so don't feel that you have to shortcut in any way.

So, with that, we're ready to call your witness.

MR. SUSSMAN: Yes, Your Honor. Thank you. The government calls Deputy Kevin Turpen, please.

KEVIN TURPEN,
called as a witness in behalf of the Plaintiff, being first duly sworn, is examined and testified as follows:

Turpen - D

1 THE WITNESS: Yes, I do.

2 DEPUTY COURTROOM CLERK: Go ahead and have a seat.
3 Speak into the microphone, and state and spell your first and
4 last name for the record, please.

5 THE WITNESS: My name is Kevin Turpen. K-e-v-i-n.
6 T-u-r-p-e-n.

7

8 DIRECT EXAMINATION

9 BY MR. SUSSMAN:

10 Q. Mr. Turpen, how are you employed?

11 A. I'm currently employed as a patrol deputy with the
12 Deschutes County Sheriff's Office.

13 Q. How long have you been a deputy sheriff for Deschutes
14 County?

15 A. I've been employed since July 1st of 1995.

16 Q. And what do your present duties include?

17 A. My present duties include typical patrol deputy,
18 investigation of crimes, crashes, public servant duties for the
19 separate districts within Deschutes County.

20 Q. And do you have any additional duties besides just routine
21 patrol?

22 A. I do. I'm a crash reconstructionist for our agency.

23 Q. And how long have you been doing that?

24 A. I went through the technical crash course in 2004 and went
25 through the reconstruction course in 2008.

Turpen - D

1 Q. Do you have the government's exhibit notebook in front of
2 you on the stand there?

3 A. I do.

4 Q. Would you turn to the tab with your name on it and
5 specifically the tab behind that, that's labeled CV.

6 A. CV. Okay.

7 Q. Do you have that document in front of you now?

8 A. I do.

9 Q. What is that document?

10 A. That's my professional curriculum of my training,
11 experience, and classes that I've been taught or taken.

12 Q. And is that your current CV?

13 A. It is.

14 Q. And do you adopt the contents of that CV for your -- as
15 part of your direct testimony here today?

16 A. Yes, I do.

17 Q. Does it include all the crash reconstruction training that
18 you've received?

19 A. Yes, it does.

20 Q. The experience you've had doing crash reconstructions?

21 A. I believe I did this CV late last year. I've had some
22 crashes since that I've investigated.

23 Q. And does it also list the nontraffic-related criminal
24 reconstructions you've done as well?

25 A. Yes, it does.

Turpen - D

1 MR. SUSSMAN: Your Honor, to the extent we need to --
2 it's already in the record -- we would offer that.

3 THE COURT: It's received.

4 BY MR. SUSSMAN: (Continuing)

5 Q. Now take a look at the next tab that's labeled Reports.

6 A. Okay.

7 Q. Do you see those documents there?

8 A. Yes, I do.

9 Q. The first document is a report that you authored dated
10 February 16, 2016?

11 A. Yes, it is.

12 Q. And does that include a diagram?

13 A. Yes, it does.

14 Q. As well as a rough sketch diagram that you prepared?

15 A. Yes, it does.

16 Q. And behind that is Grand Jury testimony that you gave on
17 May 24, 2016?

18 A. Yes, it is.

19 Q. Followed by Grand Jury testimony you gave on June 20,
20 2017?

21 A. Find where it starts. I think they're mixed together.
22 I'll stipulate that they're both in here, yes.

23 Q. And do you adopt the contents of those transcripts as part
24 of your direct testimony here today as well?

25 A. Yes, I do.

Turpen - D

1 MR. SUSSMAN: Your Honor, that's Document No. 92-1.
2 We would move for it to be admitted.

3 THE COURT: They're received. Thank you.

4 BY MR. SUSSMAN: (Continuing)

5 Q. Sir, were you working as a patrol deputy and crash
6 reconstructionist for the Deschutes County Sheriff's Office on
7 January 26, 2016?

8 A. Yes, I was.

9 Q. On that day, did you become involved in an
10 officer-involved shooting investigation in Harney County
11 outside of Burns?

12 A. Yes, I did.

13 Q. And how did you become involved in that investigation?

14 A. I don't remember specifically who called, but I was
15 requested to join the major crimes team to respond to that
16 location and investigate this incident.

17 Q. And did you?

18 A. Yes, I did.

19 Q. And what was your job to be at that crime scene?

20 A. My job initially was going to be to document all the scene
21 evidence by measuring the scene and then preparing a scale
22 diagram to reflect that evidence.

23 Q. About what time did you arrive at the shooting scene?

24 A. I believe we arrived at the command post around 11:00, and
25 then we arrived at the scene at about 1:30 in the morning.

Turpen - D

1 Q. Okay. The command post was located in Burns?

2 A. Yes.

3 Q. And the scene was located outside of Burns in
4 Harney County?

5 A. Yes.

6 Q. And you said you got there at about 1:30 in the morning?

7 A. To my recollection, yes. I was with the group that went
8 out there. We caravanned out to the scene.

9 Q. Did that group include Victoria Dickerson from the Oregon
10 State Police Forensic Laboratory?

11 A. Yes, it did.

12 Q. So you arrived at the same time as she did?

13 A. Yes.

14 Q. That was in the early morning hours of January 27 of 2016?

15 A. Yes.

16 Q. It was dark outside at the time?

17 A. Yes, it was.

18 Q. Was there any supplemental lighting in the area?

19 A. They had a gas-powered or diesel-powered light-generating
20 trailer.

21 Q. Kind of like a construction site light?

22 A. Yes. A light pole. A light pole.

23 Q. What sort of equipment do you typically use when you're
24 asked to diagram a crash scene?

25 A. I can either use a baseline method with tapes, or I have a

Turpen - D

1 Sokkia total station.

2 Q. What is a total station?

3 A. It's a laser-measuring device set on a level tripod.

4 Using a reflector, it sends out a laser beam, calculates the
5 time it takes that laser beam to return to the measuring head,
6 and then gives -- takes a measurement of the distance.

7 Q. And how accurate is that total station measuring device?

8 A. 3 millimeters at a thousand feet.

9 Q. And what was the brand name again?

10 A. It's a Sokkia. S-o-k-k-i-a.

11 Q. And how does that device record the measurements that you
12 take?

13 A. In this -- I know different brands, different models are a
14 little bit different. Mine uses what's called a data
15 collector. It's a Trimble Recon data collector. It's a
16 separate handheld -- almost like a PalmPilot. There's a cable
17 that connects between the two. Once they're synced and talking
18 to each other, then it will -- the laser head will send the
19 data to that data collector. I use a Pocket Zone diagramming
20 program in that, and it plots the points on that Pocket Zone
21 diagramming program.

22 Q. Can the measurements that the total station collects then
23 be input directly into a software program that helps you create
24 a scale diagram of the scene?

25 A. Yes.

Turpen - D

1 Q. Did you have your total station laser -- total station
2 laser measuring device with you when you responded to the scene
3 of the shooting on January 27th?

4 A. 26th. Yes, I did. Or those two days, yes, I had it with
5 me.

6 Q. Did you actually use your own total station that morning,
7 however?

8 A. No, I did not.

9 Q. Who was using the total station out at the scene that
10 morning?

11 A. When we arrived, Trooper James King, with the Oregon State
12 Police, already had his total station set up on the scene.

13 Q. And did you work with Trooper King to take the total
14 station measurements?

15 A. Yes, I did.

16 Q. Did anyone else assist you?

17 A. Yes.

18 Q. Who?

19 A. Officer John Beck from the Bend Police Department.

20 Q. Did he come out as part of the caravan with you?

21 A. Yes, he did.

22 Q. Is Officer Beck an accident reconstructionist as well?

23 A. Yes, he is.

24 Q. Are you familiar with Officer Beck?

25 A. Yes, I am.

Turpen - D

1 Q. Have you worked with him before?

2 A. Not on crashes, but in the police realm, yes.

3 Q. How about Trooper King? Is he also a trained accident
4 reconstructionist?

5 A. Yes, he is.

6 Q. So did you, Officer Beck, and Trooper King take
7 measurements of the shooting scene using the total station
8 measuring device?

9 A. Yes, we did.

10 Q. Who was operating the device itself?

11 A. Trooper King.

12 Q. And who was holding or operating the reflector?

13 A. That would be Officer Beck.

14 Q. You were doing what?

15 A. I was overseeing the measurements, kind of supervising
16 what was on scene, what we were taking measurements of.

17 Q. Were you also preparing a field sketch of what you were
18 diagramming at the time?

19 A. Yes.

20 Q. And you were personally present when Trooper King and
21 Officer Beck were taking the measurements at the shooting
22 scene?

23 A. Yes, I was.

24 Q. And, to your knowledge, did they follow -- follow
25 appropriate procedures and protocols in taking those

Turpen - D

1 measurements?

2 A. Yes, they did.

3 Q. Let's talk about what the scene looked like when you
4 arrived there. Was the white pickup truck belonging to
5 Robert LaVoy Finicum still present?

6 A. Yes, it was.

7 Q. Where was it?

8 A. It was in the snowbank off the west side of the highway or
9 the roadway.

10 Q. Describe how it was situated.

11 A. It was facing generally northbound. It had driven off the
12 road, creating a plowed push in the snow. It was sitting
13 buried in the snow up to the front bumper, and the entire right
14 side of the vehicle was up to the rocker panels, settled in the
15 snow -- sitting in the snow.

16 Q. Was it sitting flat?

17 A. It was at an angle.

18 Q. Angled how?

19 A. So the driver's side of the vehicle was higher than the
20 passenger's side of the vehicle.

21 Q. So the passenger's side of the vehicle was angled down
22 toward the roadway?

23 A. Yes, it was.

24 Q. The driver's side of the vehicle was angled up toward the
25 woods?

Turpen - D

1 A. Yes.

2 Q. Can you take a look at the Exhibits tab of that notebook
3 in front of you, please. I would like you to turn to Exhibit
4 DH44-1.

5 A. Okay.

6 Q. What is Exhibit DH44-1?

7 A. This is a photograph taken during the night. You can see
8 the reflection of the lamppost shining some light on the back
9 side away from the vehicle. This is a photograph of
10 Mr. Finicum's vehicle as it sits in the snow during our
11 investigation.

12 Q. And how deep is the snow surrounding the vehicle or how
13 deep in the snow is the vehicle?

14 A. By this picture, it is up to the front bumper. There's
15 snow packed completely in the front passenger side wheel well.
16 The --

17 THE COURT: Can you sit up a little bit or speak into
18 the mic --

19 THE WITNESS: Sure.

20 THE COURT: -- more closely? Thank you.

21 THE WITNESS: The vehicle is in the snow up to the
22 front bumper. There's snow packed into the right front tire
23 wheel well. There's snow embedded up to the rocker panels on
24 the passenger side of the vehicle. The most telling thing is
25 that the vehicle is sitting into the snow up to the front

Turpen - D

1 bumper.

2 BY MR. SUSSMAN: (Continuing)

3 Q. All right. Take a look at Exhibit 44-2. What does that
4 show?

5 A. This is another picture of the vehicle as it's settling in
6 the snow or sitting in the snow. It is -- again, you can see
7 that the snow is up into the rear passenger side tire well at
8 this point. There's snow up to the rear bumper on the side of
9 the vehicle.

10 Q. And 44-3?

11 A. This is a picture of the passenger's side of Mr. Finicum's
12 vehicle, and, again, it just represents how deep in the snow
13 the vehicle was sitting.

14 Q. 44-4?

15 A. It's another photograph from the passenger's side of the
16 vehicle. You can see the snow embedded in the -- and sitting
17 in the tire well completely covering the right front tire and
18 up to the bumper and above the rocker panels of the vehicle.

19 Q. 44-5?

20 A. This is a photograph from the right passenger's side
21 corner of the vehicle. Again, it just shows that the snow is
22 sitting up to the bumper, front bumper, of the vehicle.

23 Q. Finally, 44-6?

24 A. This is nearly a face-on shot photograph of the vehicle.
25 Again, showing that the vehicle is sitting up to the bumper and

Turpen - D

1 the wheel -- can't see the wheel wells, but sitting up to the
2 wheel wells in the snow.

3 Q. How about one more? 44-7.

4 A. This is a picture basically looking down the driver's side
5 of the vehicle, and, again, you can see the snow either -- it's
6 plowed up and up to the front bumper.

7 Q. And are Exhibits 44-1 through 44-7 fair and accurate
8 representations of how the vehicle appeared when you arrived at
9 the scene on the early morning hours of January 27 of 2016?

10 A. Yes, it is.

11 MR. SUSSMAN: Offer 44-1 through 44-7, Your Honor.

12 THE COURT: They'll be received.

13 What was the time of the photos?

14 THE WITNESS: I believe the photos were taken
15 throughout the night. It would have been after 1:30 in the
16 morning. I didn't take the photographs. I don't remember
17 exactly what time they were taken. As part of the
18 investigation, before it became light the next morning.

19 THE COURT: Thank you.

20 BY MR. SUSSMAN: (Continuing)

21 Q. Now, to your knowledge, had anyone moved Finicum's truck
22 before those photographs were taken?

23 A. No.

24 Q. Were there any other vehicles present, parked on the
25 roadway when you arrived?

Turpen - D

1 A. Yes.

2 Q. Describe what that was, please.

3 A. Basically, when we arrived, the vehicles that were there
4 were Mr. Finicum's truck off the side of the road, and then one
5 of the OSP pickups was sitting, nearly straddling the
6 centerline in the middle of the roadway.

7 Q. Facing south?

8 A. Facing south.

9 Q. And that was a silver Chevy Silverado pickup truck?

10 A. Yes, it was.

11 Q. Any other vehicles still on the roadway when you arrived?

12 A. No.

13 Q. Had there been any other vehicles parked on the roadway
14 before you got there?

15 A. Yes.

16 Q. What were those vehicles?

17 A. They were two, I believe, rented Dodge pickups that the
18 FBI had rented when they arrived in the area of this operation
19 that they were conducting. One of them was -- they were facing
20 in a wedge to the south of the Chevrolet pickup, blocking both
21 lanes of traffic.

22 Q. And they were part of the roadblock?

23 A. Yes.

24 Q. Now, those trucks had both been moved before you got
25 there?

Turpen - D

1 A. Yes, they had.

2 Q. Had anyone marked the location of either of those trucks
3 before they were moved?

4 A. Yes. The truck that was blocking the northbound lane of
5 the highway, they marked two tires on that vehicle before they
6 moved it.

7 Q. Marked them how?

8 A. With paint. Drawing a "T" along the tire on the ground
9 and then coming out from the axle so we would know where the
10 axles of the vehicle were, and they were on the driver's side
11 tires.

12 Q. Somebody spray-painted the markings on the roadway?

13 A. Yes.

14 Q. And that was visible to you when you were there?

15 A. Yes.

16 Q. So were you and the other reconstructionists able to
17 measure the precise location of Mr. Finicum's truck where it
18 came to rest in the snowbank using the total station device?

19 A. Yes, it was.

20 Q. And how was that done?

21 A. So using the reflected prism, Officer Beck held that at
22 each of the four corners of the vehicle. Trooper King then
23 took measurements of those four corners of the vehicle so we
24 would have multiple points to be able to place that vehicle.

25 Q. Was the total station able to measure the angle at which

Turpen - D

1 the pickup truck was sitting in the snow?

2 A. No.

3 Q. Did you personally measure the angle at which
4 Mr. Finicum's truck was sitting in the snow?

5 A. No.

6 Q. Did anyone?

7 A. Yes.

8 Q. Who?

9 A. Ms. Dickerson, from the Oregon State Police Crime Lab,
10 took multiple measurements of the angle of the truck.

11 Q. And she provided those measurements to you?

12 A. Yes, she did.

13 Q. Now, you mentioned that one of the three vehicles that had
14 formed the roadblock was still in place and had not been moved.

15 A. Yes.

16 Q. That was the trooper's truck?

17 A. Yes.

18 Q. The silver Chevy Silverado?

19 A. Yes.

20 Q. And were you guys able to take precise measurements of
21 that vehicle using the total station device?

22 A. Yes, we were.

23 Q. And were you also able to precisely measure the location
24 of the vehicle whose position had been marked before being
25 moved?

Turpen - D

1 A. Yes.

2 Q. Using the total station device?

3 A. Yes.

4 Q. How about the other vehicle that had been moved, the other
5 wedged vehicle? Were you able to precisely measure that
6 vehicle's location using the total station device?

7 A. No.

8 Q. There were also several FBI and OSP operators present at
9 the scene when Mr. Finicum drove his truck into the snowbank.
10 I take it that those operators were not still there in the same
11 positions when you arrived at the scene.

12 A. No, they weren't.

13 Q. Had anyone marked their precise positions at the time of
14 the shooting?

15 A. No.

16 Q. So were you and the other reconstructionists able to
17 measure precisely where those operators were at the time of the
18 shooting?

19 A. No.

20 Q. So what else did you and the reconstructionists measure at
21 the scene?

22 A. We measured numerous pieces of evidence that were pointed
23 out to us by the crime lab so we could document those for them
24 during the investigation.

25 Q. How about the location of Mr. Finicum's body?

Turpen - D

1 A. Yes.

2 Q. Items found near it?

3 A. Yes.

4 Q. Did the evidence that you marked include things like
5 expended 40-millimeter gas cannisters?

6 A. Yes.

7 Q. A spike strip?

8 A. Yes.

9 Q. Skid marks?

10 A. Yes.

11 Q. Flash bang bodies?

12 A. Yes.

13 Q. Flash bang pins?

14 A. Yes.

15 Q. What about spent shell casings?

16 A. I don't believe that we ever were able to document any
17 shell casings that were lying on the ground when we were there.

18 Q. None?

19 A. I don't believe so, no.

20 Q. Now, all of those measurements were recorded on
21 Trooper King's total station device?

22 A. Yes.

23 Q. Did he provide those measurements to you?

24 A. Yes.

25 Q. How?

Turpen - D

1 A. He gave me the data chip that came out of his total
2 station flash drive -- flash card. I then inserted that into
3 my department laptop. I downloaded the raw data files and the
4 point files, and then I was able to build the diagram based on
5 those files.

6 Q. Did Officer Beck collect any measurements of his own,
7 apart from those recorded by Trooper King?

8 A. No.

9 Q. What did you do with the measurements Trooper King gave
10 you?

11 A. When I returned to my office, over the next few days, I
12 was able to import those into my diagramming program. It
13 plotted those points to scale, and I was able to place vehicles
14 and identify pieces of evidence.

15 Q. And did you create a diagram of the scene?

16 A. Yes, I did.

17 Q. Would you take a look at Government's Exhibit DH14,
18 please.

19 A. Okay.

20 Q. Do you have it in front of you?

21 A. I do.

22 Q. What is Exhibit DH14?

23 A. That is the scale diagram of the scene that I created.

24 Q. Is that just another copy of the same diagram that was
25 attached to your report, which you adopted earlier in your

Turpen - D

1 testimony?

2 A. Yes.

3 Q. Is that actually a screenshot taken from your computer of
4 the diagram you created?

5 A. Yes.

6 Q. And is the entire diagram to scale?

7 A. No.

8 Q. What items on the diagram are not to scale?

9 A. Items 8 and 20 are not to scale on this diagram.

10 Q. What are items 8 and 20?

11 A. 8 and 20 are two rubber bullets that were fired during the
12 situation. 40-millimeter rubber bullets.

13 Q. I'm sorry?

14 A. 40-millimeter rubber bullets.

15 Q. And why are those two items not to scale on the diagram?

16 A. Because they were not visible at the time we had the total
17 station set up. They were unearthed or uncovered in the snow
18 at a later time.

19 Q. How about the rest of the items on the diagram?

20 A. Those are all to scale.

21 Q. Is that a fair and accurate representation at the scene as
22 you found it and measured it on January 26th -- I'm sorry,
23 January 27, 2016?

24 A. Yes.

25 MR. SUSSMAN: Offer Exhibit DH14, Your Honor.

Turpen - D

1 THE COURT: Received.

2 MR. SUSSMAN: Can you leave that up there, please?

3 BY MR. SUSSMAN: (Continuing)

4 Q. Now, sometime later, were you asked to return to the scene
5 and take additional measurements?

6 A. I was.

7 Q. And who asked you to do that?

8 A. Detective Brown and our team came up with new information,
9 and so we were requested to go find additional measurements of
10 the roadway.

11 Q. When did you do that?

12 A. That was on February 12th of 2016.

13 Q. And who else was with you?

14 A. Detective Brown.

15 Q. What was it you measured on February 12 of 2016?

16 A. I set my total station up on the same point that
17 Trooper King had his set up, for consistency, as he had marked
18 it on the roadway. We then measured more roadway to the south
19 after learning that shots had been fired at Mr. Finicum's truck
20 when he was driving towards the roadblock.

21 Q. What were you looking for, in particular?

22 A. We wanted to know where the first perception point was
23 where either the roadblock could have seen Mr. Finicum's truck
24 or Mr. Finicum could have seen the roadblock.

25 Q. Did you determine what that point was?

Turpen - D

1 A. Yeah. On the west side of the road, to the south of this
2 scene, there was a very vertical treeline of tall trees that
3 ran down and right along the snow that was still on the side of
4 the road. That gave us a very vertical reference point, almost
5 like the edge of a building, that anything behind that was
6 obscured for visual site, both directions.

7 We determined -- I determined that at that point would be
8 the first perception that either party would have to the other,
9 and that was measured at approximately 860 feet from the total
10 station.

11 Q. What else did you measure on February 12, 2016?

12 A. I found two road signs, one on each side of the road, that
13 I measured as reference points to potentially do speed
14 analysis.

15 Q. And did you do a speed analysis?

16 A. I did.

17 Q. What was that speed analysis based on?

18 A. That was based on a formula that is distance time equals
19 velocity or speed. If I know two of those three parameters,
20 either the distance, the time, or the speed, I can -- if I know
21 two of those three, I can calculate the third one.

22 Q. So where did you get the time from?

23 A. The time was taken off the overhead FBI video that had
24 been provided to us.

25 Q. And what -- what markers did you use for elapsed time?

Turpen - D

1 A. The road signs on the side of the road.

2 Q. And approximately how fast was Mr. Finicum's truck going
3 between the first of those two road signs and the second of
4 those two road signs?

5 A. I calculated at about 75 miles an hour.

6 Q. And between the second of the road signs and the point
7 where Mr. Finicum drove off the road, how fast was he going
8 then?

9 A. Slightly a little over 55 miles an hour.

10 Q. Now, did you also prepare other diagrams, including a
11 diagram of where Mr. Finicum's truck was located when the first
12 three shots were fired at it?

13 A. I did.

14 Q. And is that labeled as Diagram No. 2 and attached to your
15 report of February 22, 2016?

16 A. Yes.

17 Q. Are you aware that a bullet hole was found in the roof of
18 LaVoy Finicum's pickup truck?

19 A. At a later time, yes.

20 Q. The bullet hole that was marked with a letter "W" by the
21 Oregon State Police Forensic Laboratory?

22 A. Yes.

23 Q. Were you asked to plot the trajectory of the bullet that
24 caused impact "W" on the diagram that you prepared at the
25 shooting scene?

Turpen - D

1 A. Yes.

2 Q. And did you do so?

3 A. I did.

4 Q. Let's talk about how you did that. First, did you
5 personally measure the trajectory of the bullet that caused
6 impact "W"?

7 A. No.

8 Q. Where did that information come from?

9 A. Ms. Dickerson from the OSP crime lab.

10 Q. Did she provide you with the horizontal azimuth angle of
11 the bullet that caused impact "W"?

12 A. Yes.

13 Q. And the vertical angle?

14 A. Yes.

15 Q. Did she also provide you with a rate of potential error
16 for those two angles?

17 A. Yes.

18 Q. What was the potential rate of error?

19 A. She classed it as plus or minus 5 degrees.

20 Q. Now, Mr. Finicum's truck had come to rest at an angle in
21 the snowbank, had it not?

22 A. Yes.

23 Q. And Ms. Dickerson had measured the angle of the truck
24 after it came to rest?

25 A. Yes.

Turpen - D

1 Q. And she provided that measurement to you?

2 A. Yes.

3 Q. And approximately what were the measurements, the angle
4 measurements, that Ms. Dickerson gave you?

5 A. I believe there were four measurements ranging from
6 13.8 degrees to 14.9 degrees.

7 Q. What angle did you use on your diagram?

8 A. Because most of the angle measurements were within half a
9 degree of 15, I rounded it to 15 degrees.

10 Q. Now, you were actually at the shooting scene and observed
11 the truck, were you not?

12 A. Yes, I was.

13 Q. And as a trained accident reconstructionist, did you see
14 any indications that the truck had settled at all in the
15 snowbank?

16 A. No, I did not.

17 Q. None whatsoever?

18 A. There was -- there was -- on the driver's side, there was
19 some -- some scraping of the snow from the driver's front door,
20 yes. Sorry.

21 Q. What did that indicate to you?

22 A. Indicated to me that the vehicle did settle.

23 Q. Did anyone measure precisely how much the vehicle had
24 settled?

25 A. No.

Turpen - D

1 Q. Can you take a look, please, at Government's Exhibit
2 DH44-8.

3 What is Exhibit DH44-8?

4 A. This is a picture looking down at the driver's side of the
5 vehicle. At this point you can see what appears to be people
6 walking up to the vehicle, right next to the vehicle, but just
7 out from there you see a -- almost a V-shaped groove in the
8 snow.

9 Q. Next to the driver's door?

10 A. Driver's door, yes.

11 Q. Is that what you meant when you said that you had seen
12 some snow move, which suggested the settling?

13 A. Yes.

14 Q. About how much snow had moved over the course of the time
15 you were there?

16 A. What I saw through the night, I estimate to be about 2 to
17 4 inches of complete snow moving.

18 Q. That's the entire time you were there?

19 A. Over the entire time, yes.

20 Q. You arrived there at 1:30 in the morning?

21 A. Yes.

22 Q. And left there about when?

23 A. I believe I was done around 10:00 -- 9:00 to 10:00 the
24 next morning.

25 Q. So if the shooting happened sometime around 4:30, we're

Turpen - D

1 talking about a total of 2 to 4 inches over the course of how
2 many hours?

3 A. From the time I got there, eight hours.

4 Q. And is there any way to determine at what rate the truck
5 was settling?

6 A. No.

7 Q. Did you see any indication at all that the front of the
8 truck had shifted in the snowbank where it became embedded?

9 A. No.

10 Q. Either from left to right or right to left?

11 A. No.

12 Q. Did you see any indication that the rear of the truck had
13 moved from side to side as it settled?

14 A. No.

15 Q. Either from right to left or left to right?

16 A. No.

17 Q. Did you see any indication that the truck had shifted from
18 front to back after it hit the snowbank?

19 A. No.

20 Q. Or that it rocked up and down, front to rear?

21 A. No.

22 Q. Did anyone actually measure the depth of the snowbank?

23 A. No.

24 Q. Do you have an estimate of about how deep the snowbank
25 was?

Turpen - D

1 A. I would estimate between 2 and 4 feet.

2 Q. But that's just an estimate. Nobody measured it?

3 A. Yes.

4 Q. Were you present when the truck was pulled out of the
5 snowbank by a tow truck?

6 A. Yes, I was.

7 Q. How easy was it for that tow truck to get that truck -- to
8 get Mr. Finicum's truck out of the snow?

9 A. I don't remember which tow truck tried first, but the
10 first truck that tried actually snapped the tow cable from the
11 winch, trying to pull it out from the back of the truck.

12 Q. How did they get the truck out?

13 A. They had to bring in another tow truck, hook them with
14 chains, create almost a daisy-chain of two tow trucks and
15 Mr. Finicum's truck. We then had to actually help dig the snow
16 out from underneath the truck before it would break loose and
17 come out of the snowbank.

18 Q. At one point, even with two tow trucks trying to pull that
19 truck out of the snow, did one of them end up going airborne
20 for a while?

21 A. The front end of one of the trucks lifted off the ground,
22 yes, from the tension.

23 Q. Then you had to dig the front end of Mr. Finicum's truck
24 out so the two tow trucks could pull it out of the snow?

25 A. Yes.

Turpen - D

1 Q. Now, you and the other reconstructionists were able to
2 precisely measure the locations of two of the law enforcement
3 vehicles that formed the roadblock at the shooting scene using
4 the total station device?

5 A. Yes.

6 Q. Yet there were three vehicles that were used to form the
7 roadblock?

8 A. Yes.

9 Q. Did you eventually place all three vehicles on your
10 diagram?

11 A. Yes, I did.

12 Q. How did you go about placing the third vehicle on the
13 diagram if you weren't able to measure it precisely with the
14 total station device?

15 A. Using the overhead FBI video and observing that numerous
16 times and freeze-framing that at certain points, I was able to
17 use landmarks both on the road and on the vehicle to place it
18 at the location that it was.

19 Q. What sort of landmarks are you referring to?

20 A. Basically, I used the centerline compared to the left
21 front bumper of that vehicle, and those appear to be one on top
22 of the other.

23 Q. The centerline of the roadway?

24 A. Centerline of the highway.

25 And then on the rear of the vehicle, the center, where

Turpen - D

1 generally a license plate would be, but the center of the
2 bumper was directly over the fog line of the southbound lane.
3 So using those two points of reference, I was able to place
4 that vehicle.

5 Q. Now, did you also attempt to place the FBI and OSP
6 personnel on the diagram?

7 A. Yes, I did.

8 Q. And did you have total station measurements for any of
9 them?

10 A. No.

11 Q. Did you just plop them on the diagram sort of willy-nilly?

12 A. No.

13 Q. How did you go about placing the operators on the diagram?

14 A. Using the same video, observing it numerous times in
15 motion and then stopping it where I needed to, I was able to
16 use multiple reference points, again of known items or
17 locations -- in this case the Oregon State Police Chevrolet
18 pickup -- and I was able to place one FBI employee just out
19 from the right front axle of that Chevrolet, in the southbound
20 tire track of the passenger's side of the vehicle. And the
21 door was open, so he was standing just at the outer edge of
22 that open door. Using those landmarks, I was able to place one
23 FBI agent.

24 The other FBI agent was placed using the centerline of the
25 Chevrolet pickup, the right side or passenger's side headlight

Turpen - D

1 of the Chevrolet pickup, and then the distance between those
2 two appear to be equal. So he was between the centerline and
3 the right headlight. And then part of his body was shadowing
4 the Chevrolet pickup so he was very close to the bumper of that
5 pickup, standing just in front of that vehicle.

6 Q. And how did you know at what point in the FBI video you
7 needed to refer to in order to get accurate placements of those
8 people?

9 A. This vehicle -- this video had been synced at that point
10 with Shawna Cox's internal video, and we were able to use the
11 loud noise of the rifle shot to freeze-frame the video and stop
12 it after it had been synced -- those two had been synced.

13 Q. Who did the synchronization?

14 A. Detective Zach Neemann with the Deschutes County Sheriff's
15 Office.

16 Q. Not Frank Piazza?

17 A. No.

18 Q. And were you present when Detective Neemann did that
19 synchronization process?

20 A. I was not.

21 Q. But you relied on his synchronization in order to place
22 the operators on your diagram at about the time of the
23 shooting?

24 A. Yes.

25 Q. As a crash reconstructionist and in your work doing crime

Turpen - D

1 scene diagrams and reconstructions, are you sometimes called
2 upon to locate items on a diagram for which you don't have
3 precisely measured locations?

4 A. Yes.

5 Q. Does that happen often?

6 A. On occasion, yes.

7 Q. And when that happens, how do you determine where to place
8 those items?

9 A. I use the best information I have. Sometimes it will be a
10 witness's or multiple Witnesses' statements to a related known
11 point; sometimes it will be an investigator's statement to a
12 known point on the diagram; sometimes it will be the individual
13 itself. After the interview, we take that information and
14 we're able to place it based on that -- that information that
15 we have at the time.

16 Q. And in this particular case you used the FBI video, the
17 Shawna Cox video, and the synchronization of the two videos
18 done by Detective Neemann?

19 A. Yes.

20 Q. And are such things as videos and photographs and
21 measurements taken by others information of a type that crash
22 reconstructionists regularly rely upon in doing their work?

23 A. Yes.

24 Q. Let's take a look at the diagram you created. First of
25 all, we believe there's two shots fired in rapid succession

Turpen - D

1 very shortly after Finicum got out of his truck, after driving
2 into the snowbank. Did you create separate diagrams for each
3 of those two shots?

4 A. Yes.

5 Q. Take a look at Exhibit DH -- I believe it's DH15. Give me
6 just a second.

7 Yes. DH15, please. Do you have that in front of you?

8 A. I do.

9 Q. What is Exhibit DH15?

10 A. DH15 is a snapshot of the original diagram, but in this
11 case I have placed the measurements given to me by
12 Ms. Dickerson onto this diagram.

13 Q. And is this one labeled Diagram No. 5?

14 A. Yes.

15 Q. And you've got a label on there saying, "First shot
16 personnel locations based on video"?

17 A. Yes.

18 Q. Now, is this diagram completely to scale?

19 A. No.

20 Q. What parts aren't to scale?

21 A. As indicated in the lower left, it's written, "Estimated
22 location from video," and that is the vehicle -- the FBI
23 vehicle that I did not have any measurements on the scene for.

24 Q. And how about the operators that are shown on the scene
25 there?

Turpen - D

1 A. The operators are the other individuals that I did not
2 have exact locations of.

3 Q. But Mr. Finicum's truck, is that to scale?

4 A. Yes, it is.

5 Q. The roadway?

6 A. Yes, it is.

7 Q. The pickup truck in the center of the highway facing
8 south?

9 A. Yes.

10 Q. And the light-colored pickup truck which is in the
11 northbound lane wedged toward the center?

12 A. Yes.

13 Q. The furrows leading to Mr. Finicum's pickup truck, those
14 are to scale?

15 A. Those are measured by the total station, yes.

16 Q. Now, take a look at DH16.

17 A. Okay.

18 Q. What is DH16?

19 A. DH16 is just another snapshot of that diagram. It's been
20 blown up to give a better visual of its -- it's been brought up
21 so we can see that center area a little bit better.

22 Q. But otherwise it's the exact same as DH15, just a
23 zoomed-in view?

24 A. Yes, it is.

25 Q. And are both of those fair and accurate representations of

Turpen - D

1 the diagram that you prepared relative to the first shot at
2 Mr. Finicum's pickup truck?

3 A. Yes, it is.

4 MR. SUSSMAN: Offer 15 and 16, Your Honor.

5 THE COURT: Received.

6 MR. SUSSMAN: Could you leave that there for a
7 second, please.

8 BY MR. SUSSMAN: (Continuing)

9 Q. Let's talk about some of the stuff that's on there.

10 A. Okay.

11 Q. There is a blue line coming out from the right side of the
12 cab of Mr. Finicum's pickup truck. What does that blue line
13 represent?

14 A. That is a representation of the 90-degree angle that
15 Ms. Dickerson used to measure the trajectory of this shot.

16 Q. That's what she called her midline in her forensic report?

17 A. Yes.

18 Q. And what is the blue line that's transecting the pickup
19 truck, pointing roughly north/northwest?

20 A. That is a centering line that comes out at the degree
21 angle the truck measured on the diagram.

22 Q. And both of those seem to originate from the same point on
23 the cab roof of the pickup truck.

24 A. Yes.

25 Q. What point did you choose to anchor those two lines?

Turpen - D

1 A. Based on the measurements given to me by Ms. Dickerson,
2 that is the bullet impact on the roof of the truck?

3 Q. Impact "W?"

4 A. Yes.

5 Q. There's also a red line coming out diagonally toward the
6 rear and to the right of the cab of Mr. Finicum's truck. What
7 does that red line represent?

8 A. That is a degree measurement and an extended line taken at
9 35 degrees, per Ms. Dickerson's measurement, from the bullet
10 hole, and it's taken 35 degrees from the right side of the
11 truck, from the blue line coming out from the right side of the
12 truck.

13 Q. And what do those two green lines on either side of the
14 red line represent?

15 A. Those are Ms. Dickerson's statements of the
16 plus-or-minus-5-degree cone of uncertainty.

17 Q. Now, there are what appears to be three operators or
18 people on the diagram -- one in blue, one in green, and one in
19 orange. What does the figure in blue represent?

20 A. The figure in blue is Special Agent Joe Astarita's
21 location as placed from the overhead FBI video.

22 Q. Now, did you know that at the time you prepared this
23 diagram who the character depicted in blue actually was?

24 A. No, I did not. I just -- there was -- it was identified
25 to me that they were -- two of them were FBI agents and one was

Turpen - D

1 an OSP employee.

2 Q. So at the time you prepared this diagram, the person
3 depicted in blue was just known to you to be an FBI agent?

4 A. Yes.

5 Q. But you didn't know who it was?

6 A. No.

7 Q. How about the person depicted in green?

8 A. Also an FBI agent, unidentified to me other than beyond
9 that, and -- yeah, just an FBI agent.

10 Q. And how about the character identified in orange?

11 A. That was identified to me as an Oregon State Police
12 employee.

13 Q. Okay. And those were the people that you placed on the
14 diagram using the methods you described earlier?

15 A. Yes.

16 Q. Let's take a look at Exhibit DH17, please.

17 A. Okay.

18 Q. What is that?

19 A. That is another snapshot. In this case, it is moving
20 forward in time, based on the video, to where we believe the
21 second shot had taken place.

22 Q. And that's based on the synchronized video done by
23 Detective Neemann from the Deschutes County Sheriff's Office?

24 A. Yes.

25 Q. What is DH18?

Turpen - D

1 A. That is a closeup, zoomed-in view of that second shot
2 placement.

3 Q. And both DH17 and DH18 are partially to scale and
4 partially not to scale?

5 A. Correct.

6 Q. Along the same parameters that you described with the
7 prior diagram?

8 A. Yes.

9 Q. And DH18 is exactly the same diagram as DH17 only zoomed
10 in closer?

11 A. Yes.

12 Q. The same three characters or the same three people in the
13 same three colors --

14 A. Yes.

15 Q. -- denote the same three people?

16 A. I'm sorry?

17 Q. The blue -- the person shown in blue is the same person
18 shown in blue in the earlier diagram?

19 A. Yes.

20 Q. Same with the person shown in green?

21 A. Yes.

22 Q. And in orange?

23 A. Yes.

24 Q. Are those fair and accurate representations of the diagram
25 you prepared in what appeared in the video at the time of the

Turpen - D

1 second shot?

2 A. Yes.

3 MR. SUSSMAN: Offer DH17 and -18, Your Honor.

4 THE COURT: Received.

5 BY MR. SUSSMAN: (Continuing)

6 Q. All right. Now, Deputy Turpen, I would like you to take a
7 look at one more exhibit for me. It's DH45.

8 Do you have that in front of you?

9 A. DH45. Yes.

10 Q. What is Exhibit DH45?

11 A. DH45 is a photograph looking in the open door of
12 Mr. Finicum's pickup.

13 Q. And where and when was that photograph taken?

14 A. During the day. I was not present, but I believe at the
15 search warrant done at Oregon State Police in Bend.

16 Q. At their forensic laboratory?

17 A. I believe so, yes.

18 Q. Now, you saw the interior of the truck at the scene, did
19 you not?

20 A. Yes, I did.

21 Q. This is a fair and accurate depiction of the interior of
22 the truck at the time it was in the snowbank at the scene?

23 A. Yes, it is.

24 Q. I mean, it's obviously not in the snowbank now.

25 A. No.

Turpen - D

1 Q. But the truck itself is essentially in the same shape?

2 A. Yes.

3 Q. Can you tell, looking at Exhibit 45, whether that truck
4 has a manual or an automatic transition?

5 A. It is a manual transmission.

6 Q. With a clutch?

7 A. Yes.

8 Q. Have you owned and driven trucks with manual transmissions
9 before?

10 A. Yes, I have.

11 Q. What happens if you leave a truck in gear with your foot
12 off the clutch and nothing stepping on the gas?

13 A. It will -- if it has enough torque from the engine, it
14 will continue to move at idle.

15 Q. And will it do that if it came to rest very suddenly
16 without downshifting at about 55 miles an hour in a 4-foot-deep
17 snowbank?

18 A. No.

19 Q. But if the engine -- or if the gear was in neutral, what
20 would happen?

21 A. I would state that the engine would drop to idle and just
22 sit at idle. In the snowbank, it would not move. In neutral,
23 the tires would not be turning under engine power, no.

24 MR. SUSSMAN: Okay. Thank you. That's all I have.

25 Your Honor, while he's gearing up for his cross, I failed

Turpen - X

1 to offer DH44-8. And in case I didn't offer DH45, I'd offer
2 both of those at this point.

3 THE COURT: Received.

4
5 CROSS-EXAMINATION

6 BY MR. ANGELI:

7 Q. Deputy Turpen, my name is David Angeli. I represent
8 Special Agent Astarita. I'm just going to put up a couple of
9 boards to refer to through our examination here.

10 Just for the record, I've put up what's been marked as
11 Exhibits 4-02, which I think you identified during your direct
12 examination as the diagram of what you've called the first
13 shot. I think we've been referring to that as shot four. Is
14 that -- are you consistent with that lingo?

15 A. Yes.

16 Q. Okay. And 4-03 is the other board, which is a blowup of
17 the diagram that you identified in your direct examination as
18 reflecting the second shot, which we've been referring to as
19 shot five; right?

20 A. Yes.

21 Q. Okay. Deputy Turpen, I've read your CV, and I know you've
22 testified on direct about your qualifications. Your formal
23 education, if I understand correctly, you have an associate's
24 degree from -- is it Chemeketa Community College?

25 A. Chemeketa, yes.

Turpen - X

1 Q. And that's in criminal justice?

2 A. Yes.

3 Q. You don't have a degree in forensic science?

4 A. No.

5 Q. You don't have a bachelor's degree, do you?

6 A. No.

7 Q. So you don't have an advanced degree in any discipline
8 either?

9 A. No.

10 Q. I saw you've -- you've attended various training sessions.
11 Have you ever published a peer-reviewed article in any academic
12 journal on forensic science?

13 A. No.

14 Q. Have you ever published a peer-reviewed article in any
15 academic journal on any subject?

16 A. No.

17 Q. Have you ever published any textbook or chapter in a
18 textbook on any discipline or forensic science?

19 A. No.

20 Q. Ever published a textbook or any chapter in a textbook on
21 any subject?

22 A. No.

23 Q. Mr. Sussman handed you -- I think it was Exhibit 92-1,
24 which was -- you can -- it's actually behind Tab 1 in the
25 binder that I just handed to you. Hopefully we can do all this

Turpen - X

1 off of one binder. And if I understand right, that is -- those
2 are your expert materials in this case; right?

3 A. You said behind Tab 1?

4 Q. I believe so. It should be labeled Government's
5 Supplemental Exhibit 1, which is two or three pages of the
6 lawyers' writing, followed by one of your reports --

7 A. Okay.

8 Q. -- and two transcripts of grand jury testimony.

9 Do you see that?

10 A. Yes.

11 Q. Did you write any reports in this case, Deputy Turpen,
12 that were not included in Government's Exhibit 1?

13 A. No.

14 Q. Would you turn to Tab 12 of your binder, which we'll refer
15 to as Exhibit 4-12. Could you review that, sir, and tell me if
16 that's a report that you prepared on February 22, 2016.

17 A. Yes, it is.

18 Q. And does it include, as exhibits, the diagrams that you
19 had prepared in the case?

20 A. They appear to be ones I created, yes.

21 Q. So those diagrams were created sometime before February 22
22 of 2016?

23 A. Yes.

24 Q. Do you know why that report was not included in the expert
25 materials that were provided to the Court in advance of the

Turpen - X

1 hearing?

2 A. I do not know.

3 Q. We may come back to that report later.

4 Demonstrative Exhibit 4-02 that I've put up here, I just
5 want to make sure we agree that this is the same exhibit that
6 appears at page 71 of Supplemental Exhibit I, which is Tab 1 of
7 your binder. And when I'm referring to page numbers, sir,
8 you'll see down in the bottom of each page it will say
9 "Supplemental Exhibit I" and there will be a page number.

10 A. Okay.

11 Q. This says Government's Exhibit I, and there will be a page
12 number.

13 A. What page?

14 Q. Throughout the examination today, when I'm referring to
15 page numbers, that's what I'll be referring to. It's a little
16 confusing because up here there's another page number. I want
17 you to turn to page 71, if you would, sir.

18 A. Okay.

19 Q. Okay. And can we agree that 4-02 is the same diagram that
20 appears on page 71 of that exhibit?

21 A. It appears to be, yes.

22 Q. Okay. And, again, this is what the -- the positions of
23 various things that -- as you have them, when shot four was
24 fired; right?

25 A. Yes.

Turpen - X

1 Q. And 4-03, is that the same diagram that you have at
2 page 75 of your expert materials?

3 A. It appears to be, yes.

4 Q. Okay. Again, that purports to be a zoomed-in depiction of
5 where people and vehicles were at the time of shot five; is
6 that right?

7 A. If that's the second shot, yes.

8 Q. And that's the shot that you believe struck the roof of
9 Mr. Finicum's truck?

10 A. Honestly, I'm not sure which one struck the roof.

11 Q. Okay.

12 A. I may have made statements that I did, but I honestly do
13 not believe -- I don't know which round actually struck the
14 roof.

15 Q. Do you recall, sir, that you testified under oath in front
16 of the grand jury that you had concluded that the first
17 unaccounted for shot had missed the truck?

18 A. Only because it was told to me by other investigators.

19 Q. Okay. Did you -- and do you believe that, or do you
20 question that conclusion?

21 A. Honestly, I can't form an opinion. I'm not a ballistics
22 expert. I don't know which round hit the truck and which round
23 did not based on watching the videos.

24 Q. Turn, if you would, sir, to page 23 of Tab 1. If you
25 would, sir, please read for the Court lines 2 through 5 of the

Turpen - X

1 sentence that begins with the word "So."

2 A. Sorry. 2 through 5?

3 Q. Yes, sir.

4 A. "So the first shot is actually -- in the video. That's
5 the one that misses. Everybody remember one round fired and
6 misses. The second round comes through the roof, takes out the
7 window."

8 Q. Okay. And that was your testimony under oath to the grand
9 jury in May of 2016?

10 A. Yes, it was.

11 Q. Did you qualify that opinion at all to the grand jury and
12 said maybe there's a question of which shot hit the roof?

13 A. Not based on this, no.

14 Q. And that was honest testimony when you gave it?

15 A. Yes.

16 Q. So from your role in this investigation, sir, you
17 understand that the shots at issue here were fired around 4:35
18 p.m. on January 26th; is that right?

19 A. I believe so, yes.

20 Q. And I think you testified in your direct examination that
21 you arrived on the scene approximately nine hours after those
22 shots were fired. Around 1:30 in the morning on the 27th?

23 A. Yes.

24 Q. When you arrived, I think you said you made contact with
25 an Oregon State trooper named James King; is that right?

Turpen - X

1 A. Yes.

2 Q. And you observed Mr. King take his total station
3 measurements; right?

4 A. Yes, I did.

5 Q. And so it's fair to say Trooper King took his total
6 station measurements sometime after 1:30 in the morning on
7 January 27th?

8 A. Yes.

9 Q. And do you recall that Trooper King left the scene around
10 6:48 in the morning?

11 A. I honestly don't remember when he left, no.

12 Q. Could you look, sir, at Tab 5 in your binder. I can
13 represent to you, sir, that this is a report that has been
14 provided to us in discovery, and it's identified as a report
15 of, quote, "Investigating Officer T," who the government has
16 represented to us is, in fact, James King.

17 And do you see in the bottom paragraph of Trooper King's
18 report? The very last paragraph. He talks about coordinating
19 with you to take the total station measurements. And in the
20 last sentence he says that he gave all of the measured data to
21 you and departed the scene at about 6:48 a.m.

22 Do you see that?

23 A. I do.

24 Q. Is it safe for us all to rely on Trooper King's
25 representation that he left the scene around 6:48 a.m.?

Turpen - X

1 A. I think so, yes.

2 Q. So it's true, isn't it, that the total station
3 measurements that you talked about on direct were taken
4 sometime between 1:30 in the morning and 6:48 in the morning on
5 January 27th?

6 A. Yes.

7 Q. And those are the total station measurements you used when
8 you created your diagram?

9 A. Yes, they are.

10 Q. So turning back to 4-03, which is the diagram relating to
11 shot five or the second shot in question, in your direct
12 testimony, sir, you testified about the accuracy of the total
13 measuring station. Do you recall that?

14 A. From my station, yes.

15 Q. Okay. And do you believe that Trooper King's station was
16 also an accurate measuring device?

17 A. Yes, I believe so.

18 Q. So I want to make sure that all of us understand which of
19 the things depicted on Exhibits 4-02 and 4-03 were measured
20 with the total station measuring station and which were not.

21 A. Okay.

22 Q. Mr. Finicum's truck, in the upper left-hand corner of
23 Exhibit 4-03, that was measured with a total measuring station;
24 right?

25 A. Yes, it was.

Turpen - X

1 Q. All right. We'll get back to that one in a minute.

2 And the silver truck to the right of Mr. Finicum's truck
3 there, that was also measured with a total measuring station;
4 right?

5 A. Yes, it was.

6 Q. And the white truck in the lower right of the diagram was
7 measured with a total measuring station but after it had been
8 moved and put back?

9 A. It was not actually put back. The tire marks were painted
10 on the ground. It was moved in both of those vehicles. The
11 two wedged vehicles were actually completely gone from the
12 scene by the time we got there.

13 Q. Okay. So your total measuring station measured the chalk
14 mark for the white vehicle?

15 A. Yes. Yes.

16 Q. The dark gray truck at the bottom of the diagram was not
17 measured. Its position was not measured using the total
18 measuring station; right?

19 A. No.

20 Q. I'm correct?

21 A. You are correct.

22 Q. And the three individuals depicted -- the one in blue, the
23 one in green, and the one in orange -- their positions also
24 were not determined using the total measuring station; right?

25 A. Correct.

Turpen - X

1 Q. So of the seven objects depicted in your diagram, only
2 three, the position of only three was measured using the total
3 measuring station; right?

4 A. Correct.

5 Q. Let's focus for a few minutes on the position of
6 Mr. Finicum's truck as it is depicted in your diagrams.

7 THE COURT: Can we do that after recess for -- I have
8 these criminal matters set.

9 Thank you, Counsel.

10 MR. ANGELI: Very well, Your Honor.

11 THE COURT: You can step down, sir.

12 (Recess taken.)

13 THE COURT: We're ready to go. Go ahead, Counsel.

14 MR. ANGELI: Thank you, Your Honor.

15 BY MR. ANGELI: (Continuing)

16 Q. Deputy Turpen, before we broke, we were moving to the
17 position of Mr. Finicum's truck. That's what I want to focus
18 on now. Okay?

19 A. Okay.

20 Q. First of all, I think you testified on direct that
21 Officer Beck was holding a -- or had placed prism poles for
22 when the total station measurements were taken. Is that right?

23 A. Yes. Just one pole.

24 Q. Just one pole. And he moves it from point to point around
25 the truck?

Turpen - X

1 A. Yes.

2 Q. Do you know what specific points on the truck were
3 measured with the total measuring station?

4 A. On Mr. Finicum's truck, it was at the corner of each
5 bumper. So the left rear, left -- or left rear, right rear,
6 left front, and right front.

7 Q. Okay. So not the edges of the tailgate, for example?

8 A. No.

9 Q. So four points. Two on each bumper?

10 A. Yes.

11 Q. Am I correct, sir, that the position of all of the
12 items -- and by "items" I include people -- in your diagrams
13 are intended to depict their positions at the exact moment that
14 the two shots were fired?

15 A. Based on the video I observed, yes.

16 Q. Okay. So the intent -- your intention was "I'm going to
17 capture these people at precisely the moment that the shots
18 were fired"; right?

19 A. Yes.

20 Q. And am I also correct that the position of Mr. Finicum's
21 truck, as it's depicted on your diagrams, is the position that
22 truck was in at least nine hours, and maybe more, after the
23 shots were fired?

24 A. I would have to say yes. The way it was sitting in the
25 snow, it had not moved.

Turpen - X

1 Q. We'll get to that in a second.

2 A. Okay.

3 Q. I just want to make sure that the way the truck is
4 depicted in these diagrams is as you measured it nine hours or
5 more after the shots were fired; right?

6 A. Yes.

7 Q. Okay. And so you would agree with me, wouldn't you,
8 Deputy Turpen, that if the truck did move between the time
9 those shots were fired and the time you took your total
10 measuring station measurements, that truck would not be
11 accurately depicted on these diagrams as it's positioned at the
12 time of the shots?

13 A. On the way you ask that, yes.

14 Q. Okay. So you're aware, aren't you, sir, that even after
15 the truck came to a stop in the snowbank, the left drive wheel
16 continued to spin?

17 A. I am not aware of that, no.

18 Q. Turn to Tab 7, sir, if you would, in your binder. And
19 we'll call this Exhibit 4-07.

20 Sir, this is the grand jury testimony from an FBI agent
21 who's referred to in the discovery as "MF." If you would turn
22 with me, sir, to the page that has 21 up in the top right.

23 A. Okay.

24 Q. And starting at line 15. And this is Agent MF talking
25 about what everybody on the scene was doing when they were

Turpen - X

1 clearing the truck following the shooting. Tell me if I read
2 this correctly.

3 "We used a shield, sent a couple of guys up with a shield
4 to clear the truck for the two-legged threat, make sure there
5 was nobody else in there. And I think they actually turned the
6 car off and put it in park. It was still in drive at that
7 point. I think somebody reached in and turned the car off."

8 Did I read that correctly?

9 A. That I followed, yes.

10 Q. Okay. And you weren't on the scene at that time to be
11 able to refute that testimony, were you?

12 A. No.

13 Q. And turn with me, sir, if you will, to -- let me ask you
14 this question: Are you aware that one of the investigating
15 officers discovered what he referred to as a, quote, "large
16 depression" under the left drive wheel, that he concluded was
17 made because that wheel had been spinning after it hit the
18 snowbank? Are you aware of that?

19 A. I am not, no.

20 Q. Turn with me, if you would, to Tab 8 of your binder.

21 A. Okay.

22 Q. Which we'll call Exhibit 4-08. And this is a report, sir,
23 that was provided to us in discovery, and it's a report from a
24 Bend police officer identified as Officer 3866 in the lower
25 left of the -- of the first page.

Turpen - X

1 If you would turn with me, sir, to the next page, which is
2 the narrative, and the third paragraph from the bottom. Tell
3 me if I read this correctly. "After the Dodge was removed from
4 the snowbank, I noticed a large depression where the left rear
5 tire had been. The surface of the depression was frozen solid
6 and appeared to have worn smooth by the rear tire spinning for
7 an extended period of time. I then noticed the surface of the
8 left rear tire of the Dodge was smeared with marks from ice and
9 debris, which was consistent with the tire spinning for an
10 extended period of time in the snow. The marks on the tire and
11 in the tire depression led me to believe the Dodge was in gear
12 and the engine was running when it got stuck and Finicum exited
13 the vehicle."

14 Did I read that correctly, sir?

15 A. As near as I followed, yes.

16 Q. Okay. And you don't have any basis upon which to refute
17 what is reported there in Exhibit 4-08, do you?

18 A. No, I don't.

19 Q. And when you depicted Mr. Finicum's truck in your diagram,
20 did you do anything to adjust for the fact that by the time you
21 arrived on the scene the left rear wheel had sunk into what
22 this officer calls a large depression?

23 A. I'm sorry. Could you repeat?

24 Q. Sure. When you placed Mr. Finicum's truck in your
25 diagram, did you do anything to adjust for the fact that before

Turpen - X

1 you got there and took your measurement the left drive wheel
2 had sunk into what that officer called a, quote, "large
3 depression"? Did you do anything to adjust for that?

4 A. No, I did not.

5 Q. Did you analyze whether the fact that that left -- I'm
6 going to borrow Government's Exhibit -- I'm going to borrow
7 Government's Exhibit DH037. Did you adjust for the -- for the
8 fact, sir -- did you analyze whether when that left rear wheel
9 sunk into a large depression that resulted in any rotation of
10 the truck?

11 A. No.

12 Q. Didn't account for that in your diagrams?

13 A. No. Was not aware of it at the time.

14 Q. And you weren't aware of it until I just made you aware of
15 it, were you?

16 A. Correct.

17 Q. Did you perform any analysis at all to determine whether
18 the truck moved in any direction as a result of that wheel
19 dropping into a large depression before you arrived on the
20 scene?

21 A. No.

22 Q. To your knowledge, did anyone on the investigation team
23 take any measurements or do any analysis to account for that?

24 A. No.

25 Q. Now, you testified on direct that when the truck came to

Turpen - X

1 rest it was in 2 to 4 feet of snow.

2 Do you remember that?

3 A. I do.

4 Q. And do you recall you testified under oath to the grand
5 jury that your estimate was 3 to 4 feet?

6 A. Yes.

7 Q. Okay. Can we use 3 to 4 feet?

8 A. I think that's acceptable, yes.

9 Q. Okay. And at the time the truck went into the snow, as
10 opposed to when you arrived nine hours later, that snow was not
11 packed snow, was it?

12 A. I am not sure whether it was packed or not.

13 Q. Turn with me, sir, if you will, to Tab 1 in your binder,
14 which are your expert materials. Turn to page 55, please.

15 At lines 23 -- starting at line 23, in about the middle,
16 did you testify, under oath, to the grand jury, quote, "...we
17 have a hot truck that has just driven up on a plowed snowbank
18 berm that's not packed...."

19 Was that your testimony under oath to the grand jury on
20 June 20, 2017?

21 A. Yes, it is.

22 Q. And you stand by that testimony today, don't you, sir?

23 A. I think I've qualified the next part of that sentence
24 saying other than snow being blown off by the snowplow. No, I
25 don't believe that was packed by any vehicles traveling on it

Turpen - X

1 to pack it down as if it was on the roadway.

2 Q. Okay. So by the time you got there, the truck had been
3 sitting on the snow for nine hours; right?

4 A. Yes.

5 Q. That hot engine, as you testified in the grand jury, had
6 caused melting; right?

7 A. I believe so, yes.

8 Q. And all of that had refrozen by the time you arrived nine
9 hours later?

10 A. A good portion of it, yes.

11 Q. Okay. And from your experience, a hot vehicle on snow is
12 going to settle; right?

13 A. I believe it would, yes.

14 Q. And you know that Mr. Finicum's truck settled between the
15 time the shots were fired and the time you arrived nine hours
16 later; right?

17 A. I was not witness to that. I can't say that it did or
18 didn't settle before I got there.

19 Q. Okay. Fair enough.

20 Well, you testified, I think, on direct that you observed
21 from the video that when Mr. Finicum exited the truck he opened
22 the door and no snow was scraped from the door when he exited;
23 right?

24 A. Not that I remember seeing. I don't know that you could
25 see that on the video. That was actually my observations on

Turpen - X

1 the scene.

2 Q. Did you testify to the grand jury that you watched the
3 video and you concluded that when Mr. Finicum opened the door
4 no snow scraped?

5 A. I don't remember if I specifically referenced the video.

6 Q. Okay. Would you be surprised if you did?

7 A. Probably, yes.

8 Q. Okay. Let's take a look back at Tab 1. If you'd turn
9 with me, sir, to page 30.

10 Are you there?

11 A. I am.

12 Q. And tell me if I read this correctly, starting at line
13 5 -- line 4. "I believe when you guys watched the video when
14 Mr. Finicum gets out the first time, the door doesn't scrape in
15 the snow on the driver's door and it closes easily."

16 Was that your testimony under oath to the grand jury on
17 May 24, 2016?

18 A. Yes.

19 Q. And that was honest testimony, wasn't it, sir?

20 A. To the best of my ability, yes.

21 Q. And while you were on the scene, every time you opened the
22 door, more snow scraped; right?

23 A. I never did open the door.

24 Q. Well, when folks opened the door while you were on the
25 scene, every time they opened the door, more snow scraped?

Turpen - X

1 A. I can't say every time. I didn't see the door every time
2 it was opened, no.

3 Q. Let's stay on that same page we were just on, sir,
4 page 30, and starting at line 9. Tell me if this was your
5 testimony under oath to the grand jury. Quote, "...every time
6 we went to open the door for something, we started scraping
7 snow on the driver's side. Every time we did it from there on,
8 we scraped snow."

9 Was that your testimony under oath to the grand jury?

10 A. It is. I would like to point out that's probably not the
11 best choice of words.

12 Q. Uh-huh.

13 A. What I meant to say there was every time I saw the door
14 open while I was on scene I saw a little bit more snow get
15 scraped.

16 Q. Okay.

17 A. I can't say that I saw the door open every time somebody
18 opened the door.

19 Q. Okay. And you estimated to the grand jury that about 3 to
20 4 inches of snow was scraped during the time that you were on
21 the scene.

22 A. Yes.

23 Q. Okay. And are you aware, sir, that in the nine hours
24 between the shots were fired and the time you got there, other
25 officers and agents were opening the door of that truck to get

Turpen - X

1 things in and out to take a look in there and to make sure that
2 it was cleared. Are you aware of that?

3 A. Only what I saw in the Shawna Cox video am I aware of.

4 Q. Okay. And the Shawna Cox video ends within a couple of
5 minutes after the shooting; right?

6 A. I believe so, yes.

7 Q. Okay. So in the nine hours between then and the time you
8 arrive on the scene, do you know how many more times that door
9 was opened and closed?

10 A. No, I don't.

11 Q. Or how much more snow was scraped during that period of
12 time?

13 A. No, I don't.

14 Q. Okay. So we know at least 3 to 4 inches of snow was
15 scraped from the time of the shooting to the time you arrived,
16 and you don't know if it could be more than that. It might be;
17 right?

18 A. I saw a total of about 3 to 4 inches during my time there.

19 Q. Fair enough. And you don't know how much more was scraped
20 in the nine hours before you got there?

21 A. No, I don't.

22 Q. Now, your testimony, I think, on direct was that you
23 account for that scraping snow as a result of the truck
24 settling.

25 A. That was my belief, yes.

Turpen - X

1 Q. Okay. And because of that settling, you agree, don't you,
2 that the truck, as it's depicted in your diagrams, is not in
3 the same position that it was in at the time of the shooting?

4 A. I did not see the truck in the position at the time of the
5 shooting. I saw the truck when I arrived.

6 Q. Right. And I think you've just testified it settled
7 between those two periods of time; right?

8 A. That is possible, yes.

9 Q. Well, haven't you testified that you concluded that the
10 truck, in fact, settled from right to left during those nine
11 hours? Isn't that your belief?

12 A. Yes.

13 Q. Okay. And it's -- the position on your diagrams is the
14 settled position of the truck nine hours or more after the
15 shooting; right?

16 A. Yes.

17 Q. Okay. So do you agree with me, sir, that when a truck is
18 settling in the snow it doesn't necessarily settle evenly;
19 right?

20 A. I would agree with that.

21 Q. And, in fact, you believe, for example, that the left side
22 of the truck settled more than the right side?

23 A. That was my belief at the time, yes.

24 Q. Is it still your belief today?

25 A. Not necessarily, no.

Turpen - X

1 Q. What has changed?

2 A. More thinking on it, it's -- it's possible that the truck
3 settled equally down by gravity rather than rotating,
4 necessarily rotating, driver's side settling more.

5 Q. So do you believe now -- Deputy Turpen, is it your opinion
6 that the angle that the truck was in nine hours after the
7 shooting was the same angle as it was at the time of the
8 shooting?

9 A. I cannot confirm that, no.

10 Q. You don't know either way?

11 A. No.

12 Q. Okay. And you agree with me, don't you, sir, that there
13 are a number of factors that might affect how various parts of
14 that truck settle?

15 A. Yes, I would agree with that.

16 Q. Might not settle evenly across all parts of the truck;
17 right?

18 A. I would agree with that.

19 Q. So, for example, some areas of the truck, like the engine
20 compartment, way more than other parts of the truck; right?

21 A. Yes.

22 Q. And that could affect the rate at which the front settles
23 versus the rear?

24 A. That is possible.

25 Q. And the front end of the truck where a hot engine is is

Turpen - X

1 also going to be hotter than other parts of the truck; right?

2 And that could affect the rate of settling?

3 A. I would agree with that.

4 Q. And movement inside the truck, a shift of a few hundred
5 pounds of weight from one part of the truck or another, could
6 affect the way various parts of the truck settle too; right?

7 A. Yes.

8 Q. But you never actually measured, did you, the amount by
9 which the various portions of the truck settled during the nine
10 hours between the time the shots were taken and the time you
11 arrived on the scene?

12 A. No.

13 Q. And, to your knowledge, no one else on the investigation
14 team took those measurements either; right?

15 A. Not to my knowledge, no.

16 Q. Now, I think you've testified that although the truck
17 settled, you don't think that that settling caused any
18 horizontal rotation in the truck?

19 A. Based on what I observed while I was there, no, I don't
20 believe so.

21 Q. Okay. And on direct examination I think you were shown
22 some photos of the truck as it appeared more than nine hours
23 after the shooting; right?

24 A. Yes.

25 Q. And that is after all of the melting and refreezing had

Turpen - X

1 occurred?

2 A. I believe so, yes.

3 Q. Okay. Can we put up -- I'm going to show you another
4 picture that the government didn't show you. It's Exhibit 8-8.
5 It's not in your binder. We've provided a copy to the
6 government. And that's not it.

7 MR. CARY: 8-8. 8-8.

8 THE COURT: Do you want to step over and give her a
9 hand?

10 MR. ANGELI: Not sure there's much I can do,
11 Your Honor.

12 I'll have Mr. Francis jump on the Elmo in a second if we
13 need to.

14 THE COURT: Okay.

15 MR. ANGELI: Okay. There it is. Mr. Francis, can
16 you -- I'll test your Elmo capabilities. Can you zoom in on
17 the truck so we have a full picture of the truck?

18 BY MR. ANGELI: (Continuing)

19 Q. Do you remember, sir, the photos that the government
20 showed you in your direct examination?

21 A. I remember the ones shown today, yes.

22 Q. Yes. And would you agree with me that in this photo,
23 which was taken at the same time, the right rear and left rear
24 wheels of that truck are not fully encased in snow?

25 A. They appear they're not fully encased from the back, no.

Turpen - X

1 Q. When you said based on your observations when you were on
2 the scene that the truck did not rotate, you were not there
3 during the nine hours that it was settling before you arrived;
4 right?

5 A. Before I arrived? No, I was not there.

6 Q. You weren't there when the wheels were spinning for a
7 number of minutes following the truck driving into the
8 snowbank, were you?

9 A. No, I wasn't.

10 Q. And you weren't there during the time when the left rear
11 wheel sunk into a large depression, were you?

12 A. I was not there before I arrived, no.

13 Q. You weren't there when all of the passengers in the truck
14 shifted to the backseat and 500 pounds, or so, of people piled
15 out the left rear side, were you?

16 A. No, I was not.

17 Q. And you weren't there when other officers opened and
18 closed the door of that truck before you got there, were you?

19 A. Correct.

20 Q. And, to your knowledge, no member of the investigation
21 team was watching all of that activity and documenting it
22 during those nine hours, were they?

23 A. I don't believe so, no.

24 Q. And you're not aware of any measurements actually being
25 taken to determine whether any of those events or anything else

Turpen - X

1 may have caused that truck to rotate during those nine hours
2 before you arrived on the scene; right?

3 A. I am not aware of any, no.

4 Q. Did you do any analysis to determine what would happen to
5 your cone of probability in your diagrams if the rear of that
6 truck rotated just a few inches one way or the other?

7 A. No.

8 Q. Your diagrams are based on an assumption that they --
9 there was no rotation at all; right?

10 A. Yes.

11 Q. And you haven't built any margin of error into your
12 diagrams to account for the possibility of any lateral
13 rotation, have you?

14 A. No.

15 Q. I'm correct that you have not?

16 A. Correct.

17 Q. Okay. You testified that the tow truck broke a cable when
18 it arrived to try to pull that truck out of the snow.

19 Do you remember that testimony?

20 A. Yes, I do.

21 Q. And I think you testified that things were pulling so hard
22 what one of the tow trucks basically stood up on end.

23 A. Not completely on end, but I remember seeing the front
24 tires of that vehicle off the ground, yes.

25 Q. So it was yanking pretty hard on that truck to get it out

Turpen - X

1 of that iced encasement that had happened over those nine
2 hours; right?

3 A. Yes.

4 Q. And did you take any steps after that truck was pulled out
5 of there, when you got it back to Bend, for example, to
6 determine whether any of that tugging and pulling caused any
7 damage to the frame of that truck?

8 A. No.

9 Q. Did you put it up on a lift to see whether it might have
10 caused part of that frame to twist at all?

11 A. No.

12 Q. To your knowledge, did anybody on the investigation team
13 do that type of an analysis to see whether two tow trucks
14 pulling and yanking on Mr. Finicum's truck might have bent the
15 frame or otherwise twisted that truck in any way?

16 A. Not that I'm aware of.

17 Q. Now, sir, I want to spend some time talking about the
18 position of the individuals on your diagram. And if I
19 understand correctly, your testimony to the grand jury a couple
20 of different times was that you looked at the overhead video
21 and you placed the individuals, quote, "as best you could on
22 the diagrams."

23 And is that a fair summary of what you did?

24 A. Probably what I said, but it was based on landmarks of
25 known points.

Turpen - X

1 Q. Okay. So you looked at the position of the trucks, I
2 think you testified to, and said, "Well, it looks like this guy
3 is near the fender or this guy is near the centerline, and so
4 I'll put him about here." Is that -- is that a fair summary of
5 what you did?

6 A. Not "about here." I tried to use multiple points of
7 reference to place him.

8 Q. Okay. Let's -- let's break that apart a little bit.
9 You're aware, aren't you, sir, that the government has hired --
10 and he will testify here -- another expert, Toby Terpstra, who
11 has come up with a 3D image of the scene as he thinks it
12 appeared. Are you aware of that?

13 A. I'm aware of that.

14 Q. And do you know that Mr. Terpstra relied on someone named
15 Frank Piazza to sync up the Cox video and the overhead video to
16 figure out which specific frame in the overhead video
17 corresponded with shots four and five?

18 A. I'm not aware of what reference he used.

19 Q. Okay. Just to be clear, though, you did not rely on that
20 synced video that Mr. Piazza put together; right?

21 A. No.

22 Q. Mr. Piazza wasn't even retained until a couple of months
23 after you finished your diagrams?

24 A. I don't know when he was retained.

25 Q. Okay. He's never provided you with any information; is

Turpen - X

1 that correct? Mr. Piazza.

2 A. Correct.

3 Q. Have you ever spoken with him?

4 A. I have never spoken with him.

5 Q. You testified that you relied on a sync that was prepared
6 by somebody named Zach Neemann; is that right?

7 A. Yes.

8 Q. And you -- you looked at it and, I think, if I wrote your
9 testimony down correctly, you said you stopped the video,
10 quote, "where I needed to in order to figure out where the
11 people were." Is that?

12 A. Upon seeing -- upon hearing when the shot is fired, yes,
13 that's what I would be referencing to when I needed to.

14 Q. So you stopped the video when you heard the shots?

15 A. Yes.

16 Q. Okay. And based on your experience as a reconstruction
17 expert, sir, you're aware, aren't you, that we hear a shot
18 sometime after it was actually fired?

19 A. That's what I'm hearing, sitting in this -- yes.

20 Q. Okay. So if -- if you -- if you froze on a frame based on
21 hearing the shot, you would agree with me, wouldn't you, that
22 that is probably not the frame when the shot was actually
23 fired?

24 A. I didn't actually stop the video. Detective Neemann did.
25 But that was a joint effort between us.

Turpen - X

1 Q. Okay.

2 A. But, yes, what I'm hearing in the last couple of days,
3 that may not be exactly when the shots fired.

4 Q. Okay. And can you tell us -- because I haven't seen it in
5 your reports, can you tell us even which frame you used from
6 the video for either the diagram for shot four or shot five?

7 A. I did not document that, no.

8 Q. Okay. How would we figure that out, sitting here today?

9 A. I do not know.

10 Q. Don't you agree with me, sir -- I think you would agree
11 with me that at least one of these people, the officer depicted
12 in orange, was -- was moving during this period of time; right?

13 A. Yes.

14 Q. So wouldn't you agree with me that to the extent that we
15 want to show a jury a diagram of exactly where people were when
16 these shots were fired, it's pretty important for us to know
17 which frame of the video you used when you placed those people?

18 A. Looking back, yes.

19 Q. Before you completed your diagrams, did anyone share with
20 you any theories of the case?

21 A. No. We were just looking for where that shot was coming
22 from.

23 Q. So, I think, for example, you got some information from
24 people. I think you said, for example, somebody told you that
25 the blue and green figures were FBI agents; right?

Turpen - X

1 A. Yes.

2 Q. And that the orange person was an OSP officer?

3 A. Yes.

4 Q. So you knew that before you did your diagrams; right?

5 A. Yes.

6 Q. Okay. And I think you testified earlier that the reason
7 you think shot five -- the reason you told the grand jury that
8 shot five struck the roof of that truck is because someone told
9 you that; right?

10 A. Yes.

11 Q. Who told you that?

12 A. I do not remember.

13 Q. Anyone give you any information about what the agents' and
14 officers' round counts were before you did your diagrams?

15 A. Yes.

16 Q. What did they tell you about that?

17 A. The only one that I knew was that the OSP trooper's round
18 count was accurate.

19 Q. That's what -- that's what the investigating team told
20 you?

21 A. Yes.

22 Q. And you knew that before you did your diagram?

23 A. Yes, I did.

24 Q. In your prior reconstruction work, sir, have you ever
25 before placed individuals on a diagram based on a video that

Turpen - X

1 was taken more than two miles away?

2 A. No.

3 Q. To your knowledge, has placing people on a diagram from a
4 video that far away been tested anywhere?

5 A. Not to my knowledge, no.

6 Q. Are you aware of any known error rate with the method that
7 you used to place the individuals on the diagram?

8 A. No.

9 Q. Has -- has your method been published and subjected to
10 peer review anywhere?

11 A. No.

12 Q. What, if any, standards are written that govern you in
13 your work of placing these people as best you could?

14 A. Can you rephrase --

15 Q. Sure.

16 A. -- or ask again?

17 Q. What, if any, standards are you referring to in a
18 methodology when you're trying to place people as best you
19 could from a video taken two miles away?

20 A. I'm not aware of any.

21 Q. Did you try to do your analysis more than once to see
22 whether your placement of the people was replicated from one
23 try to the next?

24 A. No.

25 Q. Did you ask any of your colleagues to apply the same

Turpen - X

1 technique that you applied to see if they came up with the same
2 results?

3 A. No.

4 Q. Now, in its -- in its opposition brief in this case, the
5 government conceded that your placement of the individuals was
6 not done with mathematical precision. And you agree with that,
7 don't you?

8 A. With mathematical precision? No.

9 Q. You agree that it was --

10 A. I agree, yes, sir.

11 Q. Okay. And, in fact, I think I heard you say in your
12 direct testimony, I quote, "did not have the exact locations,"
13 closed quote, of those people; right?

14 A. I probably said that, yes.

15 Q. And so what is the margin of error that should be built
16 into your diagrams to account for the fact that those people
17 are not in the precise location that they were in when the
18 shots were taken?

19 A. I do not know.

20 Q. And your diagrams don't build in any margin of error at
21 all on that question, do they?

22 A. No.

23 Q. We talked before about some work that Mr. Terpstra did.

24 MR. ANGELI: Cheryl, if you would, I would ask you to
25 put up side by side Exhibits 4-10 -- which is Tab 10 in your

Turpen - X

1 notebook, sir -- and 4-3.

2 Cheryl, if you could tell me if this is not technically
3 possible, but if you could blow up this part.

4 THE COURT: How about moving that card so that other
5 people can see what --

6 BY MR. ANGELI: (Continuing)

7 Q. Sir, the diagram --

8 MR. ANGELI: That's fine, Cheryl. Yeah.

9 BY MR. ANGELI: (Continuing)

10 Q. The diagram on the left is Mr. Terpstra's depiction of
11 where the people and vehicles were when shot five was fired,
12 and the image on the right of the screen is your depiction of
13 where the individuals and vehicles were when shot five was
14 fired.

15 Do you see that?

16 A. I do.

17 Q. And do you see that Mr. Terpstra used the same colors to
18 depict folks that you did? He has one extra person in there,
19 but he has blue, green, and orange. Do you see that?

20 A. Yes.

21 Q. Do you agree with me, sir, there's some significant
22 differences in the placement of the individuals on your diagram
23 and Mr. Terpstra's?

24 I'll just give you an example. The OSP officer, who's
25 depicted in orange, in your diagram the OSP officer is in front

Turpen - X

1 of the green agent, isn't he?

2 A. He appears to be slightly left, yes.

3 Q. Okay.

4 A. A little further out in front, yes.

5 Q. Would you agree with me in Mr. Terpstra's diagram the OSP
6 officer is a little behind the agent in green?

7 A. Yes.

8 Q. And in your diagram there's a fair amount of separation
9 between the OSP officer and the agent in green; right?

10 A. Yes.

11 Q. And in Mr. Terpstra's diagram they're almost touching,
12 aren't they?

13 A. They appear to be much closer, yes.

14 Q. And as another example, if you look at the person in blue,
15 who you identified as Special Agent Astarita -- do you see
16 that?

17 A. I do.

18 Q. Do you see in your diagram the windshield of the silver
19 truck is completely above Special Agent Astarita's position?

20 A. Yes.

21 Q. And in Mr. Terpstra's diagram, Mr. -- Special Agent
22 Astarita is pretty much smack in the middle of the windshield
23 of that silver truck, isn't he?

24 A. Not in the middle, but lined up with it, yes. Off to one
25 side.

Turpen - X

1 Q. And so, in your opinion, Mr. Turpen, which of either of
2 these diagrams accurately depicts where these people were when
3 shot five was fired?

4 A. I think they both do to a certain extent.

5 Q. To what extent?

6 A. Observations and landmarks and points that we use to build
7 these diagrams.

8 Q. So they're both accurate. That's your testimony?

9 Was the OSP officer both in front of and behind the agent
10 depicted in green?

11 A. I think it's from the data that we had to go on at the
12 time.

13 Q. Okay. You agree he couldn't have been in both of those
14 places at the same time; right?

15 A. I agree with that, yes.

16 Q. So there's a margin of error; right?

17 A. I would have to say, just looking at these two pictures,
18 yes.

19 Q. And you've built in none in any of your diagrams, have
20 you?

21 A. No, I have not.

22 Q. Finally, I think you have already testified to this on
23 direct, but I want to make sure I understand. The -- oh, let
24 me ask you this, sir --

25 MR. ANGELI: Cheryl, can you put up 4-02 and 4-03

Turpen - X

1 next to each other? And if you could -- okay.

2 BY MR. ANGELI: (Continuing)

3 Q. So these, again, sir on the left is your diagram of where
4 you believe everything was during the first shot.

5 MR. ANGELI: And, Cheryl, can you just kind of blow
6 up on the main part of that diagram with the trucks and the
7 people?

8 BY MR. ANGELI: (Continuing)

9 Q. Okay. And then on the right, 4-03, is where you have
10 people and other objects during shot two; right?

11 A. Yes.

12 Q. You see you have that red line going out of the hole in
13 Mr. Finicum's truck on both diagrams; right?

14 A. Yes.

15 Q. But you would agree with me that both of those shots
16 didn't hit the truck in that spot; right?

17 A. Correct.

18 Q. So unless we know -- unless you know which of those two
19 shots hit the truck, how can you have that red line on both of
20 those diagrams?

21 A. It was just a representation of that 35-degree
22 measurement.

23 Q. Okay. So you would agree with me, wouldn't you, that if
24 it wasn't the first shot that hit the truck and that shot went
25 off into somewhere, like you told the grand jury, but we don't

Turpen - X/ReD

1 know where, then having that cone on that first shot diagram is
2 entirely misleading, isn't it, because you don't have any idea
3 where that shot landed?

4 A. As I did not know which shot was actually the one that hit
5 the truck, I'm not going to be able to determine which one the
6 35-degree cone goes with.

7 Q. Sir, we can do it again. You went into the grand jury and
8 you told them that the first shot was a miss; right?

9 A. I believe that's what we said today, yes.

10 Q. And at the same time you presented to them that diagram
11 that shows a shot hitting Mr. Finicum's truck and a cone of
12 probability coming out of that truck; right?

13 A. Yes.

14 Q. And don't you agree with me, now that we've established
15 that, that that's pretty misleading?

16 A. The way you put that, yes.

17 MR. ANGELI: I have nothing else, Your Honor. Thank
18 you.

19 MR. SUSSMAN: Can you leave that diagram right where
20 it is, please.

21

22 REDIRECT EXAMINATION

23 BY MR. SUSSMAN:

24 Q. Now, Deputy Turpen, you had one trajectory -- one set of
25 trajectory measurements that was provided to you by

Turpen - ReD

1 Ms. Dickerson from the State Police Crime Lab; is that correct?

2 A. Yes.

3 Q. And those measurements is what is represented on both of
4 your diagrams; is that right?

5 A. Yes.

6 Q. And you don't know whether it was the first shot that hit
7 the vehicle or the second shot that hit the vehicle; but, in
8 any event, the trajectory measurements for the one shot that
9 hit the vehicle are the same, are they not?

10 A. Yes.

11 Q. And is that what you put on that diagram?

12 A. Yes, it is.

13 Q. Did you put that on that diagram in an attempt to mislead
14 anybody?

15 A. No, I did not.

16 Q. Why did you put that on the diagram as if there were two
17 shots that hit exactly the same spot on the pickup truck when,
18 in fact, only one did?

19 A. Because they wanted to see what the separation of moving
20 individuals were, where their locations changed from the first
21 shot to the second shot.

22 Q. Was it your intention to mislead anybody?

23 A. No.

24 Q. Did you create your diagram with an intent to mislead
25 anybody?

Turpen - ReD

1 A. Absolutely not.

2 MR. SUSSMAN: Now, ma'am, if you could put the same
3 two diagrams you had up there, before these two, back again,
4 please. I believe one of them is Tab 10 and the other one is
5 one of Mr. Turpen's diagrams.

6 And if you could zoom in just like you had them before,
7 that would be good. Thank you.

8 BY MR. SUSSMAN: (Continuing)

9 Q. All right. Do you see those two diagrams on the screen?
10 The one on the left is marked 4-10, the one on the right is
11 marked 4-03. Both of them now have been zoomed in.

12 The one on the left, marked 4-10, that's Mr. Terpstra's
13 diagram, is it not?

14 A. I believe so, yes.

15 Q. The one on the right is your diagram?

16 A. Yes.

17 Q. What software program did you use to create your diagram?

18 A. I used FARO HD.

19 Q. Do you know what software program Mr. Terpstra used to
20 create his diagram?

21 A. No, I don't.

22 Q. Was yours a 3D program?

23 A. Yes.

24 Q. Was his a 3D program?

25 A. I believe so, yes.

Turpen - ReD

1 Q. Do you know whether it worked on the same principles as
2 yours?

3 A. I do not know.

4 Q. Now, his -- I think he calls them bipeds. His -- the
5 representation of people on Mr. Terpstra's diagram, they appear
6 to be larger, proportionate to the vehicles, than the people on
7 your diagram?

8 A. Yes.

9 Q. Did you scale the size of your people compared to the
10 vehicle --

11 A. No.

12 Q. -- on your diagram?

13 A. No.

14 Q. Do you know whether Mr. Terpstra did on his?

15 A. I do not know.

16 Q. When you took your measurements, you were using a total
17 station measuring device?

18 A. Yes.

19 Q. Were you using a 3D scanner?

20 A. No.

21 Q. How many points of data did you use to create your
22 diagram?

23 A. I would have to count them up. I don't remember the exact
24 number.

25 Q. But it was a finite number?

Turpen - ReD

1 A. Yes.

2 Q. One measurement for each time the rod was placed?

3 A. Yes.

4 Q. Do you know how many millions of data points

5 Mr. Terpstra's 3D scanner captured?

6 A. I don't know, but a lot more.

7 Q. And there was some discussion about the precise frame that
8 you chose for your diagram.

9 A. Yes.

10 Q. And you chose that based on the synchronization that
11 Detective Neemann prepared?

12 A. Yes.

13 Q. Was Detective Neemann there with you when you selected the
14 frame?

15 A. Yes. He actually was running the computer and stopped it.

16 Q. And does -- do you know what software he was using in
17 order to do that?

18 A. I do not.

19 Q. Detective Neemann, I assume, would know.

20 A. Yes.

21 Q. And would he be able to tell us what frame it was stopped
22 at?

23 A. I believe he could, yes.

24 Q. In case the jury needed to know at trial?

25 A. I believe so, yes.

Turpen - ReD

1 Q. Could we then call Detective Neemann to provide them with
2 that information?

3 A. I would think so.

4 Q. Now, you were asked about some testimony that was given by
5 Special Agent MF to the grand jury. I believe that was on
6 page 21 of Tab No. 7 of the defense notebook. Would you take a
7 look at that page, please?

8 A. Okay.

9 Q. And in that same paragraph, which begins on line 14, after
10 they called out anybody else in the truck, "We used a shield.
11 We sent a couple of guys up with a shield to clear the truck
12 for the two-legged threat," which I'm assuming we're talking
13 about human beings there.

14 A. That's what I would think.

15 Q. Then he goes on to say, "And I think they actually turned
16 the car off and put it in park."

17 A. That's what it says.

18 Q. It doesn't sound like he knew that the car was on. That
19 he thought it was on?

20 A. That's my interpretation, yes.

21 Q. He thought that they put the car in park?

22 A. That's what is stated in here, yes.

23 Q. Didn't you testify in your direct examination and show us
24 a photo that indicated that that car -- that the truck had a
25 manual transmission?

Turpen - ReD

1 A. Yes, I did.

2 Q. There's no gear called "park" in a manual transmission, is
3 there?

4 A. No, there's not.

5 Q. So it would appear, then, that this testimony is
6 inaccurate, wouldn't it?

7 A. Yes.

8 Q. It would appear, then, that the person who gave this
9 testimony had no idea what was going on inside that truck,
10 would it?

11 A. That's the way I read it, yes.

12 Q. And then it goes on to say it was still in drive at that
13 point; but, again, the truck had a manual transmission, didn't
14 it?

15 A. Yes, it did.

16 Q. There's no gear in a manual transmission called "drive,"
17 is there?

18 A. No, there's not.

19 Q. Once again, it appears that this testimony is inaccurate?

20 A. Yes.

21 Q. And Mr. Angeli asked you a series of questions, a
22 hypothetical question, if the truck did move, did you see any
23 indication that the truck, in fact, did move?

24 A. Yes, I did.

25 Q. And that indication was what exactly?

Turpen - ReD

1 A. The scraping of the snow every time they opened the door.
2 As I walked by, I saw it getting a little bit more and a little
3 bit more through the investigation.

4 Q. And that is Exhibit 44-8. Isn't this, 44-8?

5 A. I'll take your word, unless I look it up.

6 Q. Take a look at it.

7 A. Yes. That is -- that is what I saw on the scene, was that
8 "V" pattern from the door being opened, that it scraped the
9 snow down throughout the night.

10 Q. Okay. And that's pretty much the total scraping that
11 happened right there?

12 A. You know, it's hard -- it's hard for me to tell how deep
13 that is, and I don't know when this picture was taken; but I
14 estimated it, from my visual, to be 2 to 4 inches, 3 to
15 4 inches, in that area, of complete scrape by the end when we
16 were done.

17 Q. Did you see any indication of the back end of that truck
18 fishtailing side to side?

19 A. No.

20 Q. Or tilting side to side?

21 A. No.

22 Q. And Mr. Angeli asked you a question about the vehicle
23 sitting on the snow. Was Mr. Finicum's truck sitting on top of
24 the snow?

25 A. No, it was not.

Turpen - ReD

1 Q. Was it buried up to its chassis in the snow?

2 A. Yes.

3 Q. And he asked you whether anybody had checked to see
4 whether there was frame damage on the truck.

5 A. Yes, he did.

6 Q. Did you see any indication that there was any damage to
7 the roof area of the truck where gunshot "W" was located?

8 A. Not when I was on scene, no.

9 Q. Did you see any indication that the area where impact "W"
10 was located was damaged in any way apart from the bullet hole?

11 A. No.

12 Q. And is that vehicle still in custody at the Deschutes
13 County Sheriff's Office right now?

14 A. Yes, it is.

15 Q. So it can be examined for frame damage if need be?

16 A. Yes, it can.

17 Q. And you listened to and watched the Shawna Cox video, did
18 you not?

19 A. Yes, I did.

20 Q. You could hear what is being said by the occupants of the
21 car as you were listening to the video and watching the video?

22 A. I could hear it. I wouldn't be able to recite anything.

23 Q. Do you remember hearing anybody on the inside of that
24 vehicle say anything like, "The car is still in gear"?

25 A. Not that I remember, no.

Turpen - ReD

1 Q. Do you remember anybody saying anything like, "I think the
2 wheels are still spinning"?

3 A. Not that I remember hearing, no.

4 Q. And early on in the cross-examination Mr. Angeli asked you
5 a question, and he said so only three of seven objects were
6 measured with the total station on your diagram.

7 Do you remember that question?

8 A. I do.

9 Q. Did you measure only three things on that entire diagram?

10 A. No.

11 Q. What else was measured on that diagram?

12 A. Multiple points of each lane so that we could document the
13 lanes, both fog lines and centerline; each end of the spike
14 strip location; another tire mark, a skid mark from a following
15 vehicle that came in; multiple points of the tire path track as
16 Mr. Finicum's vehicle left the roadway and went into the snow;
17 multiple other pieces of evidence to include OC munitions,
18 canisters, pins, and other pieces of evidence; multiple points
19 of evidence, items around Mr. Finicum, to include his location
20 of his body.

21 Q. So would it be --

22 A. I'm sorry.

23 Q. Go ahead.

24 A. Basically that. Everything on scene was measured using
25 the total station except for what is documented as not to scale

Turpen - ReD

1 or estimated locations.

2 Q. And would it be more accurate, then, to say that of
3 everything that appears on the diagram, only four things -- I
4 guess six if you count the two gas cannisters -- were not
5 measured with the total station device?

6 A. The things that are placed as not to scale would be the
7 three individuals, the gray Dodge pickup, and the two rubber
8 bullets.

9 Q. And Mr. Angeli early in your cross-examination made
10 reference to chalk marks as marking the location of the
11 lighter-colored pickup truck that formed the wedge in the
12 roadblock.

13 A. Yes. Those should have been paint marks, not chalk marks.

14 Q. Somebody didn't just take a piece of chalk and mark it on
15 the pavement?

16 A. No.

17 Q. It was spray-painted?

18 A. They used a red spray paint.

19 Q. You didn't have any problem marking the locations of the
20 wheel with that spray paint?

21 A. No.

22 Q. And getting back to the difference between your diagram
23 and Mr. Terpstra's diagram, when you placed your people on the
24 diagram, were you using a photogrammetric camera matching
25 method?

Turpen - ReD

1 A. No, I was not.

2 Q. We heard repeatedly that we don't know how much the truck
3 settled.

4 A. Yes.

5 Q. Is there any way you can think of, once you got to the
6 scene, to accurately measure how much the truck may have
7 settled --

8 A. No.

9 Q. -- over time?

10 A. No.

11 Q. Or if it settled evenly or unidirectionally?

12 A. No.

13 Q. But it was buried up to and, in fact, partially over the
14 front bumper head-in in the snow?

15 A. Yes.

16 Q. And the right side of the car was buried up to and through
17 the wheel wells in the snow?

18 A. Yes.

19 Q. And the left front driver's wheel, likewise, was buried
20 into the wheel wells in the snow?

21 A. Yes.

22 Q. And that snow was pressed right up against the front of
23 the vehicle?

24 A. Yes.

25 Q. And pressed right up against the right side of the

Turpen - ReD

1 vehicle?

2 A. Yes.

3 Q. And pressed right up against the left front side of the
4 vehicle?

5 A. Yes.

6 Q. Did you find any gaps that had indicated there had been
7 shifting or movement?

8 A. No.

9 Q. Now, you said that Officer Beck was holding the prism that
10 was used to create the total station measurements?

11 A. Yes, he was.

12 Q. When he measured Mr. Finicum's truck, which was sitting in
13 a snowbank, do you remember whether he held the prism or the
14 reflector, as it's been called, vertically or horizontally at
15 the corners of the pickup truck?

16 A. They were held vertically.

17 Q. So the pole was sitting on the snow?

18 A. On or in the snow, yes.

19 Q. And when someone holds the prism to take a total
20 measurement station, what do they have to do to get an accurate
21 measurement?

22 A. On the pole, there's a centering bubble that's used for
23 level. So when you get that centered, it will place the prism
24 reflector directly over the point of evidence.

25 Q. So somebody has to look at the level, bubble level, center

Turpen - ReD

1 that bubble, and hold it tight?

2 A. Yes.

3 Q. And the truck, of course, we heard, was buried in a pretty
4 fair amount of snow.

5 A. Yes.

6 Q. How easy was it to move around the truck to take those
7 measurements?

8 A. It was problematic. At times we were in our ankles up to
9 snow; at times we were mid-thigh when we would break through
10 and drop into the snow.

11 MR. SUSSMAN: Thank you. That's all I have.

12 MR. ANGELI: Your Honor, no other questions. I would
13 just like to offer the following exhibits.

14 THE COURT: Go ahead.

15 MR. ANGELI: 4-01, 4-02, 4-03, 4-05, 4-07, 4-08,
16 4-10, 4-12, and 8-8.

17 THE COURT: Thank you. They're all received.

18 MR. ANGELI: Thank you, Your Honor.

19 THE COURT: Our next witness?

20 MR. MALONEY: Next witness is Mr. Terpstra,
21 Your Honor.

22 THE WITNESS: Fine. Thank you.

23 ///

24 ///

25 ///

Terpstra - D

1 TOBY TERPSTRA,
2 called as a witness in behalf of the Plaintiff, being first
3 duly sworn, is examined and testified as follows:
4

5 THE WITNESS: I do.

6 DEPUTY COURTROOM CLERK: Thank you. Would you please
7 have a seat. Come forward, speak directly into the mic, and
8 state your name and spell it for the record, please.

9 THE WITNESS: Sure. My name is Toby Terpstra.
10 T-o-b-y. Last name Terpstra. T-e-r-p-s-t-r-a.

11
12 DIRECT EXAMINATION

13 BY MR. MALONEY:

14 Q. Mr. Terpstra, did you bring your computer with you?

15 A. Yes, I did.

16 Q. Can you plug it into the HDMI cable up there on the
17 witness stand?

18 A. Yeah.

19 Q. Okay. Good morning, sir.

20 A. Good morning.

21 Q. What do you do for work?

22 A. So I work for Kineticorp, which is a forensic engineering
23 and accident reconstruction company.

24 Q. What kind of work do you do there?

25 A. I'm a senior forensic animator. I have a number of

Terpstra - D

1 duties, I suppose, including managing some of the younger staff
2 and -- sorry. Go ahead.

3 Q. Did you submit a CV detailing your training,
4 certifications, qualifications to hold your current position?

5 A. Yes.

6 MR. MALONEY: And, Your Honor, that was submitted as
7 ECF No. 80, pages 66 and 67, to Defense Exhibit No. 1, to their
8 underlying motion in this matter.

9 THE COURT: It will be received.

10 BY MR. MALONEY: (Continuing)

11 Q. Were you and Kineticorp retained in this case?

12 A. Yes.

13 Q. And what were you asked to do?

14 A. So I was asked to analyze an incident and --

15 THE COURT: Try to speak up and speak into the
16 microphone so every -- everybody can hear you clearly.

17 THE WITNESS: Okay. I was asked to look at a
18 specific incident and materials from it and determine whether
19 or not I could create an accurate 3D model.

20 BY MR. MALONEY: (Continuing)

21 Q. Was that a shooting incident that took place outside of
22 Burns, Oregon, on January 26, 2016?

23 A. Yes.

24 Q. And were you asked to create a 3D model of that incident
25 at and near the time of the shooting?

Terpstra - D

1 A. Yes.

2 Q. Did you prepare a report that documented the work that you
3 did in that case?

4 A. Yes, I did.

5 MR. MALONEY: And, Your Honor, that was previously
6 filed as Exhibit 8 -- or ECF No. 80, pages 68 to 158, to the
7 Defense Exhibit No. 1. We would offer it.

8 THE COURT: It will be received.

9 MR. MALONEY: Actually, Your Honor, I'll withdraw
10 that for a second because I think the witness has to make
11 corrections to that document.

12 THE COURT: That's fine.

13 BY MR. MALONEY: (Continuing)

14 Q. Is everything in that report true and correct,
15 Mr. Terpstra?

16 A. No, it's not.

17 Q. Are there corrections that you would like to make to that
18 report?

19 A. Yes.

20 Q. What corrections would you like to make?

21 A. So there is a file provided to me with video-syncing that
22 I now understand was not done by Expert Frank Piazza, which
23 I -- I believed was at the time, and so I used that instead of
24 the file done by Mr. Piazza.

25 Q. And have you had an opportunity to compare the file that

Terpstra - D

1 you used, the video file that you used, and Mr. Piazza's file
2 that he identified and testified to on Monday as
3 wja_000002.mov?

4 A. Yes, I have.

5 Q. And are those two files different?

6 A. Yes.

7 Q. Do they display the same content?

8 A. They have the same content in different arrangement on the
9 screen; but, yes, same content.

10 Q. Is there a difference in the synchronization between those
11 two files?

12 A. Yes.

13 Q. In terms of the time difference, what is the time
14 difference between those two synchronizations?

15 A. So the difference between the two frames is approximately
16 nine frames or about a third of a second.

17 Q. So what you represented in your report as the time frame
18 of the shot number five was actually nine frames before shot
19 number five?

20 A. Yes, it's before.

21 Q. And with those corrections throughout the report, any time
22 you reference shot number five, it's .3 seconds before shot
23 number five, based upon what you now know to be Mr. Piazza's
24 synchronization?

25 A. Yes.

Terpstra - D

1 Q. And with those corrections, do you otherwise believe that
2 your report is true and correct to the best of your abilities?

3 A. I do.

4 Q. And do you adopt it for the purposes of your testimony
5 today?

6 A. Yes.

7 Q. Again, with those corrections?

8 A. Yep. I would love the opportunity to correct that, but
9 yes.

10 MR. MALONEY: With those corrections, Your Honor, we
11 would offer Exhibit 80 as his testimony.

12 THE COURT: It will be received.

13 BY MR. MALONEY: (Continuing)

14 Q. Does your report set forth the procedures that you use to
15 build a 3D model?

16 A. It does.

17 Q. And can -- let's just summarize those steps. Okay? Did
18 your procedures involve reading the materials related to this
19 incident?

20 A. Yes. I reviewed materials related to the incident.

21 Q. And --

22 A. And photographs and videos as well.

23 Q. Did those include documents and transcripts from
24 proceedings as well as photographs and videos and other
25 measurements taken at the scene?

Terpstra - D

1 A. Yes. I can say that I was provided a lot of materials.

2 And I did not read through all of them, certainly, but yes.

3 Q. And was there -- was -- did you conduct a scene inspection
4 as part of your process?

5 A. Yes, I did.

6 Q. And did that include an inspection of the Finicum truck?

7 A. Yes.

8 Q. Did you measure the Finicum truck?

9 A. Yes.

10 Q. How did do you that?

11 A. So we used two different pieces of equipment -- or I used
12 two different pieces of equipment. I used a FARO Focus3D
13 scanner. It's an X330. It's a long-range scanner. And I also
14 used a smaller handheld scanner. It works optically, and it is
15 also made by FARO. It's a FARO Freestyle Object scanner.

16 Q. And, Mr. Terpstra, just be cognizant of that microphone.
17 And it would be helpful, sir, if you spoke loud enough so that
18 the people in the front row in the courtroom could hear you
19 without the amplification. Okay?

20 A. I can do better.

21 Q. All right. So you read the materials. You inspected and
22 measured the vehicle involved. Did you also go to a location
23 and inspect and measure that location?

24 A. Yes.

25 Q. Did you go to the location of the shooting incident?

Terpstra - D

1 A. Yes.

2 Q. Did you take measurements at the shooting incident?

3 A. Yes.

4 Q. And how did you measure it?

5 A. So, again, two different instruments. In this case, I
6 used the same FARO Focus X330, which is a long-range scanner.
7 I also used a total station measuring device. They're both
8 LiDAR pieces of equipment.

9 Q. And approximately how many measurements does your 3D
10 scanner take?

11 A. Well, it's -- so I had a number of different positions
12 there. I moved it a few times. And each one of those is going
13 to have millions of 3D data points. If I recall, the combined
14 data set with all of those locations between the scans, it was
15 over 192 million 3D data points.

16 Q. Do you -- those of you who do this for a living, do you
17 refer to those data sets as point cloud data?

18 A. Yes.

19 Q. Did you also conduct surveys of the site?

20 A. Yes. So I also used that total station to map the -- the
21 site, the roadway, and other elements at the scene, yes.

22 Q. Do those instruments that you've described, the scanner
23 and the survey -- the total station, do they have accuracies
24 associated with them?

25 A. Yes, they do.

Terpstra - D

1 Q. And did you test those before using them to ensure that
2 they were operating within those parameters?

3 A. I would say they're used on a regular basis. I didn't do
4 a specific test there in the field to verify their accuracy,
5 but I can say that we keep them calibrated based on
6 manufacturer specifications.

7 Q. Did your process involve a frame-by-frame analysis of the
8 videos involved?

9 A. Yes, it did.

10 Q. Did that involve the FBI overhead surveillance videos?

11 A. Yes.

12 Q. The Cox -- the Shawna Cox video from inside the truck?

13 A. Yes.

14 Q. Did you perform a detailed study of the positioning and
15 alignment of the vehicles and the people present inside of
16 those -- the frames of those videos that you studied?

17 A. Yes.

18 Q. Did you use camera match photogrammetry from multiple
19 perspectives to place vehicles, trajectories, and biped models
20 into your model?

21 A. Yes.

22 Q. And did you align your point cloud data to the scene
23 photographs within your 3D model?

24 A. Yes.

25 Q. And did you calculate a range of certainty for the

Terpstra - D

1 placement of the vehicles and bipeds within that model?

2 A. Yes, I did.

3 Q. Sir, do you use the phrase "a photogrammetry solution" or
4 a "camera match photogrammetry solution" interchangeably?

5 A. Yes, I do.

6 Q. What is a camera match photogrammetry solution?

7 A. So camera match photogrammetry is a technique or a method
8 of photogrammetry specific to using imagery and determining
9 measurements and accurately portraying those measurements. And
10 the solution can either be for a single photograph or multiple
11 photographs.

12 In this case, I would be referring to a photogrammetry
13 solution as the combination of all the camera match
14 photogrammetry images. So the solution comprises all of the
15 camera matches.

16 Q. Did you perform a camera match photogrammetry solution for
17 the point cloud data in this case and various photographs and
18 frames of video that you analyzed in this case?

19 A. So I would say, yes, I used the point cloud data, the 3D
20 point cloud data collected at the scene to inform the camera
21 matches, such that they were aligned with the photographs and
22 the video provided in this case, yes.

23 Q. Again, we're summarizing here today to give context to
24 your testimony, but the full details of your procedure, are
25 those outlined in your, what, almost 100-page report?

Terpstra - D

1 A. Yeah. Hopefully, it's not that long, but yes.

2 Q. Okay. Did you work alone in this project?

3 A. No, I did not.

4 Q. Did you have assistance?

5 A. Yes.

6 Q. And how many people were working on this project with you?

7 A. So specific to Kineticorp, the people I worked with, there
8 may have been more than two, but primarily just two other
9 individuals.

10 Q. So this was a three-person team?

11 A. Yes.

12 Q. All working in tandem on the same project?

13 A. That's true.

14 Q. And were they all performing tasks that you assigned them?

15 A. That's correct.

16 Q. Is it routine to rely on the work of other experts when
17 building a three-dimensional model like yours?

18 A. I would say it is.

19 Q. And are there peer-reviewed studies and publications that
20 validate the procedures and methodologies that you used in this
21 case?

22 A. Yes.

23 Q. Are those articles and peer-reviewed studies, are they
24 listed in your report?

25 A. Yes. Those publications are referenced in my report.

Terpstra - D

1 Q. Now, Mr. Terpstra, your work here has been criticized as,
2 quote, "simply eyeballing the video." Is that what you did
3 here?

4 A. No.

5 Q. Your work has been criticized as not analytical
6 photogrammetry and that you did no computations required to
7 achieve a valid photogrammetry solution.

8 Do you use a computer to assist you in the camera match
9 photogrammetry process?

10 A. Yes.

11 Q. Are there computer applications that are generally
12 accepted in the field of 3D computer animation specialists like
13 yourself?

14 A. Yes.

15 Q. And did you use those programs?

16 A. Yes, I did.

17 Q. Do you find them to be reliable?

18 A. Yes.

19 Q. And do they assist you with that photogrammetry analysis
20 without having to do all the manual calculations?

21 A. Yes.

22 Q. Did your -- you and your team create a video to
23 demonstrate the camera match solution that you achieved in this
24 case?

25 A. Yes.

Terpstra - D

1 MR. MALONEY: Your Honor, that was previously
2 submitted as Exhibit B. We would like to offer that at this
3 time.

4 THE COURT: Would you like to play it at this time?

5 MR. MALONEY: We do, Your Honor.

6 THE COURT: Go ahead. It will be received, and it
7 will be played.

8 THE WITNESS: Okay.

9 BY MR. MALONEY: (Continuing)

10 Q. Mr. Terpstra, I'll ask you to narrate this video and pause
11 it as necessary to describe what it is that the video depicts.

12 A. Sure. You can see my screen?

13 MR. SUSSMAN: No.

14 MR. MALONEY: No, we can't. There we go.

15 THE COURT: We're not -- are we getting it up here?

16 BY MR. MALONEY: (Continuing)

17 Q. Do you want to start the video and see where -- if that's
18 what triggers the big screen to come on, Mr. Terpstra?

19 A. Sure.

20 THE COURT: Well, wait a minute. Hold it. Our IT
21 guy was up here, and he is on -- it's not working. Do you want
22 to call Houston?

23 DEPUTY COURTROOM CLERK: I can.

24 THE COURT: Is it showing in the jury box?

25 UNIDENTIFIED SPEAKER: It looks like it's matching

Terpstra - D

1 the screen there -- never mind. It's on now.

2 DEPUTY COURTROOM CLERK: All it takes is for you to
3 call. Thank you.

4 It takes some time to switch when there's a new input, he
5 said. That, I think, is what we have.

6 BY MR. MALONEY: (Continuing)

7 Q. Okay. You can. I think we're ready. Can you try to play
8 it now.

9 A. You bet. So this video, as it plays, I'll talk through
10 what you're seeing. So at the beginning what you're seeing is
11 a scene from -- this is a point cloud of data, as we just
12 talked about, collected at the scene. So from the scene
13 inspection, this is the data collected from that. Here you can
14 see millions of 3D data points that represent the roadway, the
15 surrounding vegetation, and signs nearby.

16 As it plays, you'll see the camera animates down and to a
17 position of a photograph that was taken on the roadway. So
18 this is one of the camera matches. See here? I'll back up and
19 play that again so you can watch as the --

20 THE COURT: As I understand, that red thing is
21 your -- your equipment?

22 THE WITNESS: Oh, yes. Yeah. I'm sorry if that's a
23 distraction. That's the total station box and the equipment
24 boxes. Yes. Yep. So those have nothing to do with the scene,
25 really.

Terpstra - D

1 Then you'll see, as we -- we bring the photograph into the
2 background and then fade, you'll see the alignment of the
3 roadway markings, the lane lines on the roadway. You'll see
4 the alignment of the trees, the foliage, the mature trees
5 there, and their vertical trunks.

6 And once an alignment is achieved, such as we have a
7 camera match, we're then able to place in pieces of evidence.
8 In this case, the three vehicles that you saw there were placed
9 in the photograph.

10 Again, this is not just based on one photograph. It is a
11 photogrammetry solution.

12 So here is an example of another camera match, so we've
13 just animated or transitioned from the location of one camera
14 match to the location of another, both of those two photos were
15 taken by OSP Trooper XXXXX, I believe, and this one here is yet
16 another camera match. So this is, I guess, the third one here.
17 This one was by Ms. Doherty. This is a video, actually, so
18 we're taking a frame out of her video and then matching it
19 here.

20 So here, again, you can see the alignment of the roadway
21 striping between both the photograph and what you are seeing in
22 a 3D point cloud. In fact, you'll see the extensions left or
23 right of the photograph and how those trees align to the
24 photograph, as well as, again, the vertical trunks and other
25 portions of the trees that you can see.

Terpstra - D

1 Again, once that alignment is achieved, we're then able to
2 place in the vehicles.

3 So this here, as we rotate to more of an aerial view, this
4 is from one of the FBI fixed-wing aircrafts. So this is a
5 video frame that we used for camera matching. And here, again,
6 you can see the alignment of the fixed objects at the scene,
7 the roadway striping, the lane lines, the fog lines, the
8 pavement, also the trees and the foliage. And, once again,
9 we've positioned those vehicles to align and match with that
10 photograph.

11 Here is yet another one. So this is another camera match.
12 All of these offer unique perspectives as the FBI aircraft was
13 circling around the vehicles and around the scene, such that
14 the angle is different from one to the next, and they're all --
15 all the vehicle placements are consistent in our model between
16 each one of these camera matches.

17 So in some of these views the vehicles are partially
18 obscured by trees, but hopefully you can see -- when the photo
19 comes up, you can see enough of the vehicle or portions of the
20 vehicle where you're able to see the alignment and how that was
21 created.

22 I'll back up one second here so you can see. In this
23 point cloud data, you can actually pick out paint marks that
24 were captured by the 3D scanner. I'm not sure if you guys can
25 all pick that up from there, but there's orange paint marks on

Terpstra - D

1 the roadway surface. I'll try and point to a couple of them
2 here. Those are collected by the 3D scanner as it photographed
3 the scene.

4 Then we're feeding in the vehicle positions that are in
5 agreement with those -- those paint marks.

6 So at this point in time we're pausing on the camera
7 match. We're zooming in on a portion of it so you see the
8 vehicle positions a little bit more clearly. This is one of
9 the frames that we used to analyze the positions of different
10 parties involved or the character models that we've placed.
11 I'll sometimes refer to them as "bipeds."

12 So here is the frame that, to my previous understanding,
13 was at shot number five. We're going to do the same thing here
14 where we fade in the vehicle positions and then we're going to
15 zoom in and show those partially faded out and then bring in
16 the character positions, so you can see how those are in
17 alignment and agreement with the video position.

18 We're also showing a trajectory cone. Trajectory as
19 determined by ballistic expert Mr. Haag. That had a
20 5-degree -- it's a 5-degree cone off of his trajectory
21 placement.

22 Then here we're showing a top-down view of that diagram.
23 So these are all the positions that were determined through
24 camera matching photogrammetry. So the last 12 photographs or
25 video frames that I just showed you in this video and their

Terpstra - D

1 agreement with the scene data, the point clouds, the total
2 station survey. You can see the total station survey lines
3 here are depicted with black lines that overlay. So that data
4 there is from the total station. And then we're positioning in
5 the 3D models, and you can see their alignment from -- from
6 previous -- with all the camera matches. So this is the
7 photogrammetry solution. All these vehicles are depicted in
8 this diagram from those 12 matches. And then, of course, we
9 have the characters here and their positions from a frame of
10 the video.

11 Q. Did you bring -- go ahead. Is this the trajectory as
12 well?

13 A. Yes.

14 Q. And I want to ask a couple of questions about the vehicle
15 and that trajectory if you can hold it on that -- that screen
16 there for a second. Right -- right where it is.

17 Now, the vehicle data, you said that you scanned the data
18 for the -- for Finicum's truck?

19 A. Yeah. So we saw -- I was at the vehicle inspection the
20 day before the scene inspection. We went and saw Mr. Finicum's
21 truck over at OSP where it's being held.

22 Q. Did you take a 3D scan of that truck?

23 A. I did. I took, I believe, 11 separate 3D scans with the
24 FARO Focus3D scanner, the lower-range scanner.

25 Q. Was that with the trajectory rod in place?

Terpstra - D

1 A. There may have been a scanner tube with it in place with
2 that scanner, but I did not scan using that scanner with the
3 intention of capturing data on the trajectory rods themselves.

4 Q. Did you use and incorporate Mr. Haag's 3D scan data to
5 your model?

6 A. I did.

7 Q. Can you describe for the Court how you did that?

8 A. Yes. So if I can just take a step back, there's three
9 sets of 3D scan data, two of them which I collected at the
10 scene. One of them, as I mentioned, I didn't have the
11 equipment that I used for documenting the vehicle. I didn't
12 intend to capture trajectory rods with that, so I used another
13 scanner. That was the FARO Freestyle Object. That's a
14 handheld scanner, so I could collect more data points in a
15 specific area on the trajectory rod.

16 So those two data sets, as well as the data set provided
17 by Mr. Haag and his Leica scanner, which did include the
18 trajectory rods, all of those three were aligned to each other
19 and positioning inside 3D Studio Max where we also aligned it
20 to a geometric version or a 3D model of the vehicle.

21 Q. This geometric 3D model, was that something that you
22 purchased commercially?

23 A. Yes.

24 Q. And is -- were all those measurements consistent with the
25 vehicle manufacturer data?

Terpstra - D

1 A. Yes. So I can't recall on this time -- on this instance,
2 but we've -- we often purchase vehicles online, and sometimes
3 they're not in perfect agreement, so in which case we make
4 adjustments so it both matches the vehicle manufacturer's
5 specifications, wheel base track width, length width, overall
6 height, as well as the 3D scan. So the, I guess in this case,
7 33 million data points captured by our scanner, the resulting
8 point cloud of data on Mr. Finicum's truck, we used both of
9 those to inform and create our geometric 3D model of his truck.

10 Q. Now, the other models in the -- or the other vehicles
11 depicted in your model, where did those data sets come from?

12 A. To the other vehicles?

13 Q. Yes, sir.

14 A. Those are also purchased commercially. I believe some of
15 them are of the same model. In fact, they're sister years for
16 the Dodge pickup. We were able to use them. We're changing
17 colors, of course, to avoid confusion and to be more consistent
18 with what we're seeing in the photographs. So they're all
19 purchased commercially, including the Silverado, yeah.

20 Q. So you talked about the characters or bipeds. Are those
21 the models of people that are in this three-dimensional model?

22 A. That's correct.

23 Q. How did you obtain and size those people?

24 A. So, again, they're commercially available models. They're
25 also rigged such that you can move and position them, their

Terpstra - D

1 arms and legs, in a way that is consistent with kinematics, and
2 the -- the overall height, I guess, and understanding of
3 dominant hands, all those -- and weapons that are being used.
4 That information was provided to me by SSA Cunningham.

5 Q. And did you scale the people based upon the physical size
6 that you were provided by Mr. Cunningham -- Special Agent
7 Cunningham?

8 A. That's correct.

9 Q. He told you how big they were, what their heights and
10 weighting were?

11 A. Yes.

12 Q. Did you approximately -- is that represented in the model?

13 A. Yes. I would say generally just the height. Potentially,
14 weight at some level, but yeah.

15 Q. Okay. Talk about the -- we've got this orange cone
16 depicted in this -- this frame here. How did you place what
17 into your model?

18 A. Sure. So as we talked about the vehicle model and how it
19 was created using those 3D point cloud data sets, those three
20 different data sets, those data sets also included points that
21 were collected using the 3D scanners on the trajectory rods
22 themselves, so we were able to model a cylinder, not a cone, as
23 you see here, but actually a cylinder that represents the
24 trajectory rod and its placement by Mr. Haag in the inspection.

25 THE COURT: Why don't you play the whole creation

Terpstra - D

1 here and then back up and go into the detail.

2 MR. MALONEY: Yes, Your Honor.

3 BY MR. MALONEY: (Continuing)

4 Q. Can you continue playing the video?

5 A. Sure. Would you like me to start from the beginning or --

6 THE COURT: No. Right now.

7 (Video playing.)

8 THE WITNESS: Okay. So that's pretty much it, and I
9 think it's probably set to repeat here, but I can stop it.

10 THE COURT: The whole thing is only four minutes,
11 isn't it?

12 THE WITNESS: Yeah. Just a little over four minutes.

13 THE COURT: So let's just play the four minutes, and
14 you can talk while it's playing.

15 THE WITNESS: Okay.

16 (Video playing.)

17 BY MR. MALONEY: (Continuing)

18 Q. So you were talking about the vehicle with the cylinder
19 that you used to replicate the -- and position a cylinder for
20 the trajectory rod that Mr. Haag placed using his rocker
21 method?

22 A. Yes.

23 Q. And that was something that you had scan data from the
24 vehicle inspection?

25 A. Yes. I was at the vehicle inspection the same time

Terpstra - D

1 Mr. Haag was there, so he placed, using his rocker point
2 method, that trajectory rod, and it was captured in both his
3 scan data as well as my scan data, and that scan data is what
4 we used to create the cylinder, the geometric cylinder that's
5 represented in the 3D model of the vehicle.

6 Q. Now, the cone, how did you create the cone that we're
7 seeing in the video?

8 A. So that's going to be based on Mr. Haag's direction, with
9 the plus-or-minus-5-degree range of certainty on the trajectory
10 rod.

11 Q. And how do you place the apex of the cone on the vehicle?

12 A. Okay. So the apex -- two ways, I guess, I would say.
13 One, the bullet defect labeled "W" is visible inside the 3D
14 scan itself, so we can see where that bullet hole is on the
15 roof of the truck in our scan data because there's so many
16 points that are defining the roof of the truck; and, secondly,
17 I would say it's also consistent with the point cloud -- or the
18 3D data points from scanning that were scanned on the rod
19 itself. So once we created that, the model for the trajectory
20 rod, and extended that, it went through the bullet -- the
21 bullet hole in the roof labeled "W." So we can see it in the
22 scan data. That's where the apex of it is located.

23 Q. And all of this data, was that provided to the defense?

24 A. Yes. Yes.

25 Q. Did you provide it to me to provide to the defense, or did

Terpstra - D

1 you provide it directly to someone associated with the defense
2 team?

3 A. Yes. I believe it was provided directly to Mr. Noedel.

4 Q. And you did that?

5 A. Yes.

6 Q. Did you give him all your raw data?

7 A. Yes.

8 Q. Did you give him all these millions of data points and
9 point clouds that you're talking about?

10 A. That's correct.

11 Q. And did you give him the actual 3D model?

12 A. Yes.

13 Q. But if they had your raw data, did they have everything
14 they would need to replicate the work that you did in creating
15 this 3D model?

16 A. Yes. So the visualization or 3D animation that you're
17 seeing on your screen right now is actually rendering from that
18 file itself. So the file that we provided them, they could
19 simply render this out from that. The point cloud is in there.
20 The 3D models of the vehicles, the position for each one of
21 those cameras and 3D space, as well as the background image,
22 was referenced in that file. So they had access to all of
23 that.

24 Yes, I would say all the data was included inside this
25 file.

Terpstra - D

1 Q. Did you attempt to ascertain a range of certainty for the
2 objects that you placed into the scene using your camera match
3 photogrammetry methodology?

4 A. Yes.

5 Q. Can you describe that process, please?

6 A. Sure. So because the vehicle positions -- I'll just talk
7 about vehicles specifically here for a second. So because the
8 vehicle positions are determined and aligned between 12
9 different individual camera matches, it's possible to move
10 the -- incrementally move the vehicle such that you can see
11 where it's no longer in agreement with one or multiple
12 photographs.

13 So in this instance we moved it forward and backward along
14 its longitudinal axis. So the vehicle moving forward and
15 backwards, I believe, in increments of an inch or thereabouts.
16 I would have to look at it again. And when it was no longer in
17 agreement with the photographs, then we -- we stopped it at
18 that point, and that's how I determined my range of certainty
19 or range of error for the vehicle placement. Similar --

20 Q. And --

21 A. Go ahead.

22 Q. Finish your thought.

23 A. So similar methodology was used for determining the range
24 of error for the biped models or the character models for --
25 that represent the people, the parties involved in the

Terpstra - D

1 incident.

2 So after we placed them to match the frames inside the
3 video, we then went and incrementally moved them so that we
4 could see what the range of -- certainty range of error was.

5 MR. MALONEY: Your Honor, I'm about to enter another
6 topic. I see we're on the noon hour. I'm happy to proceed.
7 I'm about halfway done.

8 THE COURT: I think it's a good time to take our
9 break now, and let's pick up at 1:00. 1:00.

10 MR. MALONEY: Thank you, Your Honor.

11 THE COURT: You played that through now; right?

12 THE WITNESS: Yes.

13 THE COURT: It's on repeat?

14 THE WITNESS: Yes.

15 THE COURT: Okay. Thank you.

16 THE WITNESS: You bet.

17 THE COURT: We're in recess, folks. See you at 1:00.

18 (Lunch recess taken.)

19 THE COURT: Have a seat.

20 MR. MALONEY: Thank you, Your Honor.

21 BY MR. MALONEY: (Continuing)

22 Q. Mr. Terpstra, we're going to pick up where we left off.
23 We were discussing your 3D model. Did you bring a copy of that
24 model today?

25 A. Yes.

Terpstra - D

1 Q. Would it assist you to refer to your model in
2 demonstrating certain aspects of your testimony?

3 A. Yes.

4 MR. MALONEY: Your Honor, at this time we would like
5 the Court's permission to display the 3D model. We did provide
6 a copy to the Court, but we don't intend to offer that into the
7 public record at this time.

8 THE COURT: All right. That's up to you.

9 MR. MALONEY: Thank you, Judge.

10 BY MR. MALONEY: (Continuing)

11 Q. Could you call that up on your screen, please.

12 A. You bet.

13 Q. Okay. Mr. Terpstra, can you please describe what we're
14 looking at here in the 3D model.

15 A. Yes. So this is a representation of the scene. Again,
16 you see the 3D point cloud at the scene. You also see -- here,
17 I'll select them for you, but this line work here, as well
18 as the --

19 THE COURT: Will you project your voice, please?

20 THE WITNESS: I'm sorry.

21 THE COURT: You're here to be heard.

22 THE WITNESS: So you'll see the 3D point cloud and
23 then, again, the total station survey is represented here by
24 the black line work -- I'll select it here -- as well as the
25 paint marks that were surveyed with the total station as well.

Terpstra - D

1 And then the rest of the model -- so the vehicles and then the
2 characters that represent the people involved, those are all
3 placed, again, through photogrammetry. This specific
4 orientation or positioning for the biped characters is for what
5 I had previously, you know, worked with under the understanding
6 that was the time of shot five.

7 BY MR. MALONEY: (Continuing)

8 Q. So this is actually .3 seconds before shot five?

9 A. That's correct.

10 Q. And that's based upon Mr. Piazza's identification of a
11 different file than the one you used as the -- the synchronized
12 file for the audio for shot five?

13 A. That's correct.

14 Q. Okay. Can you demonstrate for us how this model provides
15 different perspectives?

16 A. Sure. So --

17 THE COURT: Well, just so I've got a color code here,
18 do you want to identify the individuals by color?

19 THE WITNESS: Yes.

20 THE COURT: I can just read it.

21 THE WITNESS: That will be great.

22 MR. MALONEY: Your Honor, we were going to try to
23 keep some of the names out -- we had abbreviations to be
24 consistent with our pleadings.

25 THE COURT: The only name I'm going to use is

Terpstra - D

1 "Finicum."

2 MR. MALONEY: Thank you, Your Honor.

3 THE COURT: And your -- and the defendant.

4 The -- the pink is Finicum, red is a special agent, blue
5 is the defendant, green is a special agent, orange is an OSP
6 trooper, and yellow is the supervising special agent.

7 THE WITNESS: Thank you.

8 BY MR. MALONEY: (Continuing)

9 Q. Can you demonstrate how you're able to see the model from
10 different perspectives?

11 A. Sure. So since it's -- the model is located in 3D space,
12 we can rotate around. Right now I have selected one of the
13 persons involved, and I'm using him as a point of reference to
14 rotate around. So this model can be viewed from any vantage.

15 Just change the vantage here real quick.

16 So now we're looking at it in a perspective view. It can
17 also be used to show -- here are the list of cameras or frames
18 and photographs that we used for camera matching. I can click
19 on one of those, and it will display the image in the
20 background. So you can see the alignment between the 3D model
21 of the scene as well as the -- and the photograph. Sorry.

22 Q. How many different camera matches did you use to achieve
23 this solution and position the vehicles in the model?

24 A. So there were 12 individual camera matches that were used
25 for the vehicle positioning, and then one or two, depending on

Terpstra - D

1 what frame, for the bipeds or the persons involved.

2 Q. Okay. Can you take us through the different perspectives
3 for the vehicle placement that you used in your camera
4 matching?

5 A. You bet. So the first few cameras here, I'll just walk
6 through. The first one here is labeled C01A, and that's
7 specific to a camera. So the naming sequence -- we have four
8 different cameras that we used from the scene. The first one
9 is from a trooper. The second one is also from a trooper. The
10 third camera match here, that's labeled C02, because we've
11 moved to a second camera. This one is from Ms. Doherty, from
12 her video. And then as we moved beyond that, camera three is
13 one of the fixed-wing FBI aircraft videos.

14 So there's 3A, -B, -C, -D, and -E. All of those are from
15 that same fixed-wing aircraft. And then camera four is from a
16 second fixed-wing aircraft, and we have 04A, -B, -C, and -D
17 here in the file.

18 Then if we take any one of these -- there's limitations to
19 viewing a photograph like this because the photograph actually
20 contains more resolution than what you're able to just see at
21 full scale on the screen here. So we can actually zoom into
22 the photograph and show specific areas of it.

23 So you can, you know, assess the alignment a little bit
24 easier that way and take full advantage of the resolution of
25 that photograph and see the alignment between the photograph

Terpstra - D

1 and the 3D model positioning.

2 I'll click on another image here in one second.

3 So this photograph is from a later point in time, after --
4 after shot five; but, again, the bipeds are still in here that
5 represent shot five. So obviously our photograph image doesn't
6 have, for instance, Mr. Finicum in here, if you're seeing that.
7 But the vehicle models all -- all three of them that are placed
8 here from this -- the one that we see in front here has
9 actually been moved at the scene. So this was not its original
10 location, and that's why you see the ones behind it are placed,
11 but you can't really see through that one very well from this
12 specific camera match. So you can see those in other matches.

13 So this one is a little bit earlier in time. This is the
14 video from Ms. Doherty, and you can see the positions of those
15 vehicles here as I zoom in on this one. So we have the three
16 vehicles in the roadway there, and we also have Mr. Finicum's
17 truck.

18 I don't know if you would like me to go through more of
19 the individual camera matches showing that, or if that's --

20 Q. Now, are the -- did you use any of the mature foliage as
21 part of your camera match and alignment for your point cloud
22 data?

23 A. Yes. Absolutely.

24 Q. Can you describe for the Court how you did that?

25 A. So it's really similar to all the other fixed objects at

Terpstra - D

1 the scene. In camera matching photogrammetry, you need, of
2 course, a 3D data set, which we collected at the scene during
3 the scene inspection, you need that accurate representation of
4 the scene in 3D space. And then you also need photographs or
5 video to work with, but the two of those need to have common
6 points in between them. So you have to have common points that
7 are visible both in your data set, so the scan data, those 3D
8 points, as well as in the photograph.

9 And those common points that haven't changed out there at
10 the scene, for instance, the lane lines, the fog line, the edge
11 of pavement, and, as you were referencing, the mature trees or
12 foliage out there, those become fixed points where you can --
13 each one of those trees is a unique data set. Right?

14 So while -- if we were to look at this tree here, it's
15 unique from the other trees around it. Right? You can see its
16 trunk more clearly from this vantage than some of the other
17 ones. It's also going to have branches at different levels.
18 The trunk itself may be a little bit thicker. Its orientation,
19 in comparison to other trees, is very unique. Right?

20 So it's not a repeating scene where I can achieve this
21 camera match at different locations. There's a specific point
22 where the camera is aligned to -- the virtual camera in the
23 software is aligned to the 3D data set.

24 Q. Now, this alignment, is this something you can do by
25 printing off the photographs or printing off pictures from the

Terpstra - D

1 screen that you're displaying right now?

2 A. So can I perform camera matching photogrammetry outside of
3 the computer? Is that your question?

4 Q. Well, it -- yes.

5 A. So there is a method that's similar, called reverse camera
6 projection, which you can -- if you're at a scene, you can
7 actually use similar principles and techniques to try to align
8 your vantage. So I can take a printed photograph of the scene
9 and I can walk through the scene and try and align myself to
10 that specific vantage where the photograph was taken. But it
11 doesn't usually allow the opportunity to -- that can be useful
12 for a couple of different ways, but it doesn't really make
13 itself useful in a case like this where you are wanting to
14 place in pieces of evidence, say, in your 3D model to
15 complete -- a complete 3D diagram.

16 Q. When examining the model, is it easier to do that in the
17 virtual environment on a computer screen?

18 A. Yes.

19 Q. Is that the manner in which the model is designed to be
20 viewed?

21 A. Yes. Yes. So our 3D model, it's -- it's created inside
22 the -- on the computer. It's a computer 3D environment, and so
23 that being its native form and how it was created, I would say,
24 yeah, it's best viewed on a computer rather than a print.

25 Q. Your model has been criticized for the virtual

Terpstra - D

1 placement -- for the placement of a virtual camera being
2 inconsistent with the actual position of one of the aircraft
3 cameras that took the videos. In your opinion, is that a valid
4 criticism?

5 A. No.

6 Q. Why not?

7 A. Well, there's a lot of different parameters for a camera.
8 As we were solving for these virtual cameras and their position
9 in 3D space in the model, we have to take into consideration
10 their X, Y, Z locations, so their position in 3D space. Right?
11 We also have to take into account the rotation. Is it yawed or
12 rolled or pitched? So those are all parameters. But you also
13 have outside the physical location and orientation of the
14 camera. There's also characteristics inside the camera that
15 determine what you're viewing. And one of those is a field of
16 view.

17 For instance, if you're zooming with a photograph, you're
18 changing -- like a typical point-and-shoot camera, if you're
19 using the zoom on that, you're changing your field of view
20 where you're able to see more or less of your scene through
21 that camera.

22 In this case, I actually -- I actually have a good example
23 of how you can change your field of view as well as your
24 position of the camera and achieve a camera match solution for
25 both from different elevations, I guess, as it pertains to this

Terpstra - D

1 case.

2 Q. Can you demonstrate that for the Court, please.

3 A. Yeah. So sorry. One second here.

4 So to orient everybody to the issue, we have fixed-wing
5 FBI aircraft that's recording this video and the specific frame
6 that we're looking at here, and you'll see that there's text
7 printed at the bottom of the video. Right? So this text on
8 the right side has the label "TGT" for "target." On the left,
9 you can see "ACFT," which, my understanding, is that's for the
10 aircraft.

11 Here on the -- in the middle, you'll see an elevation of
12 5,206 feet. That is for the terrain at that level. So that's
13 a mean of sea level. It's 5,206 feet. To the right of that,
14 you'll see a 1.9 NM. That stands for "nautical miles." So the
15 target is 1.9 nautical miles away from the camera.

16 And then on the left, if you look at -- you're looking at
17 that elevation, it's 10,451 feet mean of sea level. That's the
18 elevation of, again, the aircraft. ACFT.

19 So if we look at this match here, I'll go back to that
20 quad view here and pull up a different vantage. So inside the
21 model -- let me step back, actually.

22 So inside the model, if I grab the camera that we're using
23 for this -- so you'll notice the labeling here is C04D. This
24 is the camera match that's oriented to the -- that specific
25 frame or that camera match frame from the video.

Terpstra - D

1 And you'll see, if I grab that camera and move it to the
2 left or the right, that -- sorry. You're looking at a
3 different camera in that view there.

4 One second here.

5 Okay. So now we're looking through that camera. And if I
6 grab that camera in a different view port, you will see -- if
7 you're looking at the bottom right view port, you'll see our
8 vantage begins to move. All right?

9 So suddenly these lane lines are no longer in alignment
10 because I moved the camera to one side or the other. All
11 right?

12 So that camera view represents this blue camera here, and
13 we're looking through that camera in the bottom right view
14 port. Hopefully that makes sense to everyone.

15 Now, to associate those distances or those elevations back
16 to the video, maybe zoom in here real quick so everybody can
17 see. This is the terrain and here is our scene with the
18 vehicles. Okay? And then what I've selected is a -- I
19 apologize because my scroll wheel is misbehaving there.

20 The length of this box is set to 5,206 feet, and you'll
21 see that's the elevation of the terrain on the -- from the
22 video down here.

23 So that establishes our sea level down here, this black
24 line. Right?

25 And then I've drawn another box that represents a specific

Terpstra - D

1 length. So this one is 10,451 feet in elevation. That would
2 be the elevation of the aircraft. So if we look again at the
3 video -- I'll bring that back up a little bit larger. So
4 looking at the video, 10,451 feet on the bottom left here,
5 that's the elevation of the aircraft.

6 And then one more dimension real quick is the -- you'll
7 see I've created a -- another box with the length of
8 11,544 feet, 7.2 inches. That's actually a conversion from the
9 1.9 nautical miles. So that's how many feet are in 1.9
10 nautical miles.

11 So you can see why the criticism was made. It makes sense
12 that our camera right here is not that -- at that distance from
13 the target. Right? But if we take another camera, so this --
14 this camera right here, I've labeled it "C04D elevation," and
15 if we go back, I will show you what that one looks like real
16 quick.

17 So let me make this bottom right view port large. Again,
18 we're looking through C04D camera right now. I'm going to
19 change that so we're looking through C04D elevation, which is
20 the one set to the correct elevation, and I just switched it
21 there. I don't know if you guys are able to see that, but I'll
22 undo that real quick. So camera C04D we're looking through
23 here. So note the alignment of the vehicles, the lane lines,
24 and all of that, to the scene. In fact, I'll unhide it here
25 real quick. Okay. There's the point cloud too. So you'll see

Terpstra - D

1 the alignment. This is the initial alignment we had there.

2 As I switch to the other camera -- so this is going to be
3 camera C04D elevation. I switched to that one. Again, you'll
4 see the alignments between all the elements in the scene,
5 including the vehicles, the trees, any of those discrete and
6 unchanged points on the roadway.

7 If I can, for a second, I'll demonstrate this issue
8 further by showing -- so our camera properties in this case,
9 you can see we have a lens of 143.841 millimeters on our camera
10 solution. Right? And then to get to the proper elevation,
11 which is this yellow camera here, we've changed it to 604.363
12 millimeters. So it is a different lens on there, which
13 establishes a different field of view for that camera; but you
14 can see how both of them are in alignment.

15 Now, this green camera here, what we've done is we've
16 calculated to keep a set field of view such that the width of
17 the roadway stays consistent from one position to the next as
18 we move along the site path of that camera. So both of these,
19 the yellow camera and the blue camera, as we position them
20 there, are in the same sight path. Right? They're just
21 farther away from the targets.

22 So this one we've run through and calculated how to keep
23 that consistent through both of them. You'll see, if I select
24 this camera from this view and animate it, it starts very close
25 to the scene and then moves all the way up and past the correct

Terpstra - D

1 elevation camera there.

2 I'll bring our scene back into play there.

3 So it actually animates beyond even the -- on that same
4 line of sight path. It animates beyond the camera that
5 represents the correct elevation, as based on the video.

6 Now, if we are to look through that camera, this animated
7 green camera that I had selected in the bottom right view port,
8 which I'm going to show you here in one second -- so this one
9 you'll notice is called "camera plot" just because we had
10 plotted out that -- what it would take to change that field of
11 view.

12 So if I change to this camera, which is, again, called
13 "camera plot," now we're looking through this one. I'm going
14 to go ahead and go down early on where it's very close to the
15 scene, and you'll see that this -- this is going to fall apart.
16 So as we get very close to the scene, I'm going to say, like,
17 maybe frame 20 here -- and I'm going to blow up this bottom
18 right view port. So at this distance from the scene, we can --
19 we can match the width of the roadway at one point, but you'll
20 see -- now we're off. Right? So if I hide the geometry, you
21 can see our survey. Those black lines no longer match in the
22 foreground or in the background of this photograph. Right? Up
23 close, they're no longer in alignment; in the background
24 they're no longer in alignment. But they work at one point,
25 and that's the fixed point that we've animated about.

Terpstra - D

1 So if I -- if I page through here, you'll see -- once I
2 start getting to a certain elevation, that alignment is
3 achieved, and it is -- it continues to be achieved all the way
4 through -- beyond -- beyond that camera that's at the correct
5 elevation.

6 So if I play through those both together to where you can
7 see on the top right and the bottom right, you can see our
8 camera, how it's -- I'm just going to turn on the geometry real
9 quick here, too, so you can see that.

10 Okay. So you can see, again, as I get really close to the
11 terrain, it doesn't match. Right? So here is our green camera
12 very close to our terrain at the scene. As I move along that
13 sight path, farther up in elevation, and I get -- approach the
14 camera we have in blue, it's very close to alignment here, if
15 not in alignment. And then we hit our blue camera position.
16 Everything is in alignment. Moving beyond, the yellow, also in
17 alignment, and beyond.

18 So there's multiple -- once you talk about a certain
19 distance that you are away from a scene, a field of view, while
20 it changes, it doesn't change your perspective in a significant
21 way to where you would not be able to achieve a camera match.
22 So everything in the scene is aligned at a specifications field
23 of view, but that field of view, as you move forward or
24 backward along that line of sight, can still -- you can still
25 achieve a camera match solution at different points along that

Terpstra - D

1 line of sight.

2 I apologize if that was too long and wordy for everybody.

3 It's kind of a complex issue to talk through.

4 Q. Did you correct for lens distortion?

5 A. Yes.

6 Q. And did you correct for lens distortion in all your camera
7 matches?

8 A. No.

9 Q. Why not?

10 A. So our typical procedure for running through camera
11 matches -- lens distortion is just something that should be
12 considered in all forms of photogrammetry because it has to do
13 with the curvature of your lens. Right? So any lens is going
14 to have some amount of lens distortion on it that could
15 potentially affect your photogrammetry solution. So it's
16 important when you're using photographs to the images from a
17 camera to consider the optics or the lens and how that lens may
18 be distorting your image. Right?

19 So our -- our typical process is to always consider it.
20 And what we did on the -- on the first camera and the second
21 camera, we had information from EXIF data, which is header
22 information included in a file that would tell us exactly what
23 camera make and model was used to take the photographs, or, in
24 this case, photographs and video.

25 So both of those were able to use a -- actually, I --

Terpstra - D

1 yeah, I think both of them we were able to use from a database
2 of no lens correction values software to remove the lens
3 distortion. So that was easy for us to do, and we went forward
4 and did that.

5 That's our procedure to first -- any time we can remove
6 lens distortion, we do that through a library.

7 Our second step, of course we would have done the same for
8 the FBI fix-wing aircraft, but I had no provided information to
9 me about that camera's make or model, nor did I have access to
10 it such that I could determine the lens distortion values for
11 myself.

12 So rather than -- there's methods that we've -- actually,
13 my company and myself personally have written on how you can
14 still remove lens distortion when EXIF data is not available,
15 when you don't have access to the camera, and you can't figure
16 out what lens, make, or model of the camera was used. There's
17 methods for still removing that lens distortion.

18 In this case, what we did is we camera-matched these to
19 find out how much lens distortion there was. So we started
20 right in on our process of matching and aligning it to the
21 scene to get a feeling for can we match this without removing
22 lens distortion? In this case, what we found is we could.

23 So while there's other processes that we can and would
24 use, if we found that there was distortion significant that it
25 would affect our results -- in this case, we found there wasn't

Terpstra - D

1 a significant amount of lens distortion in the FBI fixed-wing
2 aircraft videos such that we would need to remove lens
3 distortion and proceed with one of those other published-upon
4 methods.

5 Q. Your model has been criticized because the frames and
6 photos you used were of such quality that the positions of the
7 vehicles and biped models could be adjusted and still appear to
8 be properly aligned.

9 Do you agree with that criticism?

10 A. No, I don't.

11 Q. Can you explain why?

12 A. Yes. Well, specific to the -- that criticism, I was
13 provided with a file from Mr. Liscio, who had adjusted both the
14 vehicle and the character positions, and so I took those, the
15 models that he had provided. So we gave them the file. He
16 worked in that file, moved models for the vehicle and a couple
17 of the bipeds or character models inside that file and then
18 provided that back to us. So it's in the same coordinates
19 system. There's no issue for importing it.

20 So I imported his position for both the biped models as
21 well as the vehicle model back into my file, and I was able to
22 analyze differences between how he had adjusted them versus how
23 we had originally positioned them with the video. And I found
24 them to be inconsistent or no longer in agreement with the
25 video or photo -- photo frames.

Terpstra - D

1 Q. Do you have screenshots or can you display that for the
2 Court when you scrutinized the changed positions that the
3 defense expert did?

4 A. Sure. So I'll start with the -- the truck positions. So
5 this is a photograph you guys have seen a few times now here.
6 This was our first camera match, and you can see the camera
7 match here with the point cloud data and the position of the 3D
8 model. Here is our positioning with the model, and then, as I
9 page to the next one, you will see the position as provided us
10 or positioned by Mr. Liscio. So there's two different
11 positions there.

12 As we zoom in on that portion of the photograph, now you
13 can see again here is the position that we placed the vehicle
14 in, and then here is Mr. Liscio's position. Sometimes it's
15 tough to see both of those at the same time because I'm
16 toggling back and forth. Hopefully you can all see that
17 motion. I created this graphic to visually represent the
18 differences in alignment there.

19 So the -- the key, I guess, bottom left, the color key,
20 you can see our outline of the vehicle is positioned in green
21 there, and you can see how that, at least in my mind, better
22 represents and visually is aligned to the photograph.

23 And then you can see Mr. Liscio's position there in the
24 orange or yellowish color and how that does not agree with the
25 position of the vehicle.

Terpstra - D

1 Q. And the positioning of that vehicle is critical to the
2 placement of the trajectory rod; correct?

3 A. Yes.

4 Q. Okay. Do you have another example?

5 A. Sure. So here is the very next photo. This is C01B.
6 Here you can see, again, those two positions, at least from
7 this vantage, when you're not taking full advantage of the
8 resolution of this photograph, but it's -- I mean, the
9 photograph is full screen right now on my computer; but as I
10 toggle between the two of those, there's only a shift in a
11 couple of pixels. It's very tough to see the movement of this
12 vehicle.

13 But as I go and zoom in on it, you'll see again from --
14 from this perspective, as the vehicle is rotated clockwise from
15 our position to Mr. Liscio's position, it is no longer in
16 alignment with the photograph.

17 Again, I've created another image with the outlines just
18 to help from a clarity standpoint. You can see our position
19 outlined in green and Mr. Liscio's outlined in orange.

20 Q. Okay. Do you have an example with respect to the
21 character or biped placement?

22 A. Sure. So this is the camera match C04D. This is what
23 would be nine frames before shot five, but as -- in my report,
24 I've identified it as shot five based on my understanding at
25 that point in time.

Terpstra - D

1 So we're walking through the position of the bipeds here.
2 This is Kineticorp's alignment of Special Agent BM or SSA BM.
3 And here in orange is Mr. Liscio's positioning for the same
4 special agent. Special Agent BM. So I'll toggle back and
5 forth between the two of those.

6 Then if I show that from a different angle inside the
7 model -- so this is looking at it kind of from the side. Here
8 is the position in green. These are both standing on the
9 roadway surface, and here is Mr. Liscio's position here
10 crouched down in front of the vehicle. You can see that to
11 move him -- I believe his measurement was 12 inches, or one
12 foot. To get him to move that much in this and towards the
13 vehicle here in this case, he had to crouch him down into what,
14 at least in my mind, is kind of an awkward stance.

15 And -- and at this point, I -- I mean, it would be outside
16 of my realm to say that it's not a correct shooting stance, but
17 what I can say is that the frames previous or subsequent to
18 this one, if you're looking at them, you do not see this agent,
19 so Special Agent --

20 THE COURT: Is Mr. Liscio here?

21 MR. FRANCIS: Yes, Your Honor.

22 THE COURT: Can you identify him?

23 Raise your hand, please.

24 Thank you. Can you hear?

25 MR. LISCIO: Yes, I can.

Terpstra - D

1 THE COURT: I want to make sure you're hearing him
2 because we're going to be hearing from you shortly.

3 MR. LISCIO: It's very clear. Thank you.

4 THE COURT: Thank you.

5 Go ahead.

6 THE WITNESS: Thank you. So in the frames previous
7 and subsequent to this position, there's no indication. You
8 can see SA BM, Special Agent BM, you can see his position, like
9 his head position, in relation to the vehicle. If I was to
10 pull up the photograph again, or the video frame, you would see
11 the light-colored vehicle behind him. It's easy to make out
12 where his head position is. In the frames prior to and
13 subsequent, you cannot see him, as he's moving at any point in
14 time, duck and -- and so you don't see him make motion as he's
15 walking to a crouched position. So I don't believe it's
16 consistent with the video the way it's been positioned here in
17 the model.

18 BY MR. MALONEY: (Continuing)

19 Q. Do you have another --

20 THE COURT: How about for the blue? What about the
21 comparison for the defendant?

22 THE WITNESS: Okay. Well, Mr. Liscio didn't give me
23 a position for the defendant, but I do have -- the blue one
24 here is for special -- sorry. It's for trooper one. So I can
25 walk through that one if that's easier.

Terpstra - D

1 THE COURT: No, that's fine.

2 You go ahead.

3 MR. MALONEY: Thank you, Judge.

4 BY MR. MALONEY: (Continuing)

5 Q. Mr. Terpstra, does the positioning of Special
6 Agent Astarita -- can you point on your screen where he is in
7 that photograph?

8 A. Yeah.

9 Q. And does his position change? Is he moving -- let me
10 rephrase. Is his position moving during the frames before and
11 immediately after shot number five or -- or what you have come
12 to know to be shot number five?

13 A. No. I don't believe there's any significant movement
14 visible in the video for the defendant in the frames prior to
15 and subsequent of shot five.

16 Q. And we're talking approximately how long when the video is
17 playing normal speed? How long does he hold that position
18 that's demonstrated on your screen right there?

19 A. So I can't answer that question completely because I
20 didn't do an analysis of how many frames after, but I can tell
21 you, based on the two positions that we did match, there are 35
22 frames separate from each other. So 30 frames per second.
23 You're looking at over a second that he shows essentially no
24 movement.

25 Q. And are the other personnel on that video moving at that

Terpstra - D

1 time that the defendant is standing still?

2 A. There are other individuals that are moving, yes.

3 Q. Are the individuals in the front of the centerline truck
4 moving?

5 A. Yes.

6 Q. Mr. Terpstra, based on your work in this case, your
7 training and experience in the field of forensic 3D scene
8 reconstruction and camera match photogrammetry, did you form an
9 opinion to a reasonable degree of forensic 3D scene
10 reconstruction certainty as to the reliability of the 3D scene
11 reconstruction you made in this case?

12 A. Yes.

13 Q. What is that opinion?

14 A. My opinion is that the models were placed --

15 THE COURT: Speak into the mic and keep your voice
16 up.

17 THE WITNESS: Okay. My apologies.

18 My opinion is that the models that we had placed
19 in this -- the characters and the vehicle models in this scene
20 model are all accurate and representative of the camera
21 matches. They're consistent between all 12 of the images or
22 the number of images that were available for us to place them.

23 BY MR. MALONEY: (Continuing)

24 Q. Within the stated ranges of certainty from your report, is
25 your model a fair and accurate representation of the scene .03

Terpstra - D/X

1 seconds before the shots heard on the Cox video?

2 A. Yes.

3 MR. MALONEY: Thank you, sir.

4 THE COURT: Your witness.

5 MR. FRANCIS: Your Honor, we've just gone through
6 somewhat dense testimony --

7 THE COURT: I can't hear you. You have to speak --
8 come over and speak into the microphone or at the lecturn.

9 MR. FRANCIS: Yes. Can you hear me now, Your Honor?

10 THE COURT: No.

11 MR. FRANCIS: Your Honor --

12 THE COURT: Just do what I say. Use -- use the
13 microphone over here or use it up there, but not in between.

14

15 CROSS-EXAMINATION

16 BY MR. FRANCIS:

17 Q. Good afternoon, Mr. Terpstra.

18 A. Good afternoon.

19 Q. Your Honor, can you hear me all right?

20 THE COURT: Perfect.

21 MR. FRANCIS: Wonderful. Thank you very much.

22 BY MR. FRANCIS: (Continuing)

23 Q. Mr. Terpstra, my name is Tyler Francis. I'm an attorney
24 for Special Agent Astarita.

25 A. Okay.

Terpstra - X

1 Q. Now, on direct, you mentioned that there are studies that
2 validate the methodology that you used in this case.

3 A. Yes.

4 Q. And you cited a number of those studies in your report in
5 this case?

6 A. Yes, I did.

7 Q. If we could bring up page 15 of Tab 1.

8 Mr. Terpstra, generally, I would ask that you refer to the
9 monitor. We may be drawing or doing things on the monitor in
10 front of you. We'll be looking at essentially the same things
11 that are in the binder. If we have a technological
12 malfunction, you've got the binder there.

13 THE COURT: You're not projecting, Counsel.

14 MR. FRANCIS: I apologize. Is that better?

15 THE COURT: Keep your voice up. You're here to be
16 heard.

17 MR. FRANCIS: Yes, sir.

18 BY MR. FRANCIS: (Continuing)

19 Q. All right. Mr. Terpstra, would you agree -- let's see. I
20 see here on your list of articles that you have cited in your
21 report, one of them is -- is this paper right here. Applying
22 camera match -- camera matching methods to laser-scanned
23 three-dimensional scene data in comparison with other methods.

24 Do you see that?

25 A. Yes, sir.

Terpstra - X

1 Q. If we could bring up Tab 2, please.

2 Is this a copy of that paper documenting that study?

3 A. Yes.

4 Q. Have you read this?

5 A. Yes.

6 Q. Are you familiar with what it describes?

7 A. Yes, I am.

8 Q. Would you agree that of the articles that you have listed
9 in your report, this one gives the best description of the
10 camera matching methodology that you employed in this case?

11 A. Sorry. "Best" is tough to say. I know there's a number
12 of them listed. I would have to review the methodology
13 specific in each one. I'm familiar with those papers, but for
14 me to make a qualification as to which one I feel is the best,
15 I'm not certain I'm comfortable saying that about this paper at
16 this time.

17 Q. Is there one that you think gives a better description of
18 your methodology than this one?

19 A. Possibly. Again, I would have to review and see. They're
20 similar.

21 Q. You have Tab 2 in front of you in the binder. Take a
22 minute and take a look at it. There's a methodology section
23 and description of the technique a few pages into that article.

24 Take just a few moments, look at it, and tell me when
25 you're done.

Terpstra - X

1 MR. FRANCIS: Cheryl, if we can flip forward a couple
2 of pages. One more. There. And the next page.

3 THE COURT: Instead of doing this laboriously, point
4 out a section that you're relying on and ask him about it.

5 MR. FRANCIS: Certainly.

6 Cheryl, which page are we now on? Unfortunately, these
7 pages don't have numbering on them.

8 BY MR. FRANCIS: (Continuing)

9 Q. Well, Mr. Terpstra, do you see this page in front of you?

10 A. Yes.

11 Q. Are you familiar with the methodology described here in
12 this paper?

13 A. Yes.

14 Q. Is -- do you recognize that as being similar to the
15 methodology that you used in this case?

16 A. Yes. I believe so.

17 Q. Are you aware of any of the other papers that you've cited
18 in the report that you've written that give a more accurate
19 description of your methodology?

20 A. Sure.

21 Q. Which one?

22 A. Well, I don't know that I would say it's more accurate.
23 It's --

24 Q. That was my question. Do you know the paper that gives a
25 better description of your methodology than the one that you're

Terpstra - X

1 looking at?

2 A. I'm not sure if it's better.

3 Q. Okay. All right. Mr. Terpstra, I would like to walk
4 through your process that you go through in a little bit more
5 detail so that you and I have a common understanding of how
6 exactly your procedure and your workflow work. All right?

7 A. Sure.

8 Q. All right. So, as I understand it, the first step in your
9 analysis is to select the photographs and the video stills that
10 are -- that you are going to analyze.

11 A. Yes. I mean, if you were going to ask me to characterize
12 what my first step is, I would say I need to visit the scene or
13 the object, or whatever needs to be used in camera matching, to
14 ascertain three-dimensional data to use for camera matching,
15 but yes.

16 Q. To start, photogrammetry is a process where we're trying
17 to use techniques to determine where things are positioned in a
18 picture; right?

19 A. That's correct.

20 Q. The first step is you have a picture you're looking at?

21 A. Correct.

22 Q. That's the goal. Where are these things located in this
23 picture; right?

24 A. Yes.

25 Q. And that picture, that can be a photograph; that can be a

Terpstra - X

1 video frame. Correct?

2 A. Yes. Yes.

3 Q. All right. Then in this case what you did is you went out
4 and gathered or created various 3D models that you were going
5 to later combine together. Is that a fair -- fair broad
6 summary of what we're talking about?

7 A. Yes.

8 Q. So I'll go into those in a little bit more detail.

9 So we have, in this case, Mr. Finicum's truck with the rod
10 sticking out of it; correct?

11 A. Okay.

12 Q. That's one of the ingredients that we start with?

13 A. Okay.

14 Q. You've described your method for generating and creating
15 that model of Mr. Finicum's truck with the trajectory rod
16 sticking out of it?

17 A. Yes.

18 Q. And you described the scanners that you use in order to
19 come up with that model?

20 A. Yes.

21 Q. And that's a combination of several things, isn't it?

22 A. Yes.

23 MR. FRANCIS: All right. Cheryl, if we can bring up
24 Tab 4, please.

25 ///

Terpstra - X

1 BY MR. FRANCIS: (Continuing)

2 Q. All right. So what are we looking at here in Tab 4?

3 A. So this photograph appears to me to be a photograph taken
4 at the time of the vehicle inspection. I see the roof of
5 Mr. Finicum's vehicle with the label "W" for the bullet hole or
6 the defect in the roof. I also see a white trajectory rod
7 that's been placed.

8 Q. You scanned this, this assemblage that we're looking at
9 right here; right?

10 A. Yes.

11 Q. If we can go to the next -- to Tab 5, please. That's you?

12 A. Yep, that's me.

13 Q. And that's your ladder and your equipment and the --
14 Mr. Finicum's truck?

15 A. No. That's not my ladder.

16 Q. That's someone else's ladder. You're going to climb on it
17 soon, I assume?

18 A. Yes.

19 Q. And those targets, those little -- the little target
20 things that we see on the image there, what are those?

21 A. Those are useful for registering with the optical scanner
22 you see in my hand. So those are unique targets. Each one of
23 them has a unique and specific pattern to them. And the
24 scanning -- the scanner can recognize those and use those as
25 reference points as you scan, you know, moving across the

Terpstra - X

1 vehicle.

2 Q. All right. And what is this?

3 A. I believe you're circling the trajectory rod.

4 Q. The same one we just saw in the previous picture?

5 A. Yes.

6 Q. So the goal of what you're doing here is taking a handheld
7 scanner and scanning the position of that trajectory rod as
8 Mr. Haag has taped it into place onto Mr. Finicum's truck?

9 A. Yes.

10 Q. And was that the only scanned data that you used in order
11 to come up with the combined model of Mr. Finicum's truck plus
12 rods sticking out of it?

13 A. I'm sorry. Was what the only?

14 Q. Was the handheld scanner data --

15 A. No.

16 Q. -- that we're seeing here in the picture of you gathering,
17 is that the only source of information for the -- what comes to
18 be a model of Mr. Finicum's truck with the rod sticking out of
19 it?

20 A. No.

21 Q. What else did you use to come up with that model?

22 A. So we used the scan data from this and then the scan data
23 that I collected with the FARO Focus X330. It's the long-range
24 FARO scanner. Also used that in conjunction with scan data
25 provided by Mr. Haag. He collected that with his Leica

Terpstra - X

1 scanner. Then we compared those, as well, to manufacturer
2 vehicle specifications of the Dodge truck. So the overall
3 length, width, height, wheel base, track width.

4 Q. Now, you mentioned on direct examination that you can see
5 the impact "W," the defect marked "W," in the -- in the cloud
6 point data. The 3D laser scanners have enough precision to
7 pick up that hole?

8 A. Yeah. And, for clarity, I suppose it's not picking up the
9 hole.

10 Q. All right.

11 A. Because you wouldn't need points to be taken in a 3D space
12 where there's nothing, right, so --

13 Q. The light has to bounce off something. There's a hole
14 that's not bouncing off anything.

15 A. The perimeter around the hole.

16 Q. The light is not bouncing off the hole. It's bouncing off
17 of the metal that surrounds the hole; correct?

18 A. Correct.

19 Q. And since we have the hole, are you -- is there a process
20 that you are going through to place the rod into the hole in
21 some fashion, or -- please explain to us how it is that you
22 come up with the rod in the correct position relative to
23 Mr. Finicum's truck.

24 A. Sure. So I did not place the rod in Mr. Finicum's truck.
25 That's information that I'm relying on its placement from

Terpstra - X

1 Expert Michael Haag. And then it was scanned with both the
2 scanner that you see me holding in this picture, as well as his
3 Leica scanner. Once those models were aligned in 3D space, we
4 created a cylinder that represented the trajectory rod.

5 Q. And the cylinder, specifically the width of that cylinder,
6 that's plus or minus 5 degrees; correct?

7 A. No. That would be the cone, but --

8 Q. I'm sorry. So the -- explain. So the cylinder is the
9 rod? Is that what you're describing as the cylinder?

10 A. Correct.

11 Q. The trajectory rod.

12 A. Correct.

13 Q. And then on top of that rod you're adding the
14 plus-or-minus-5-degree cone?

15 A. Yes.

16 Q. And that information on how wide to make that cone is
17 provided to you by Michael Haag?

18 A. That's correct.

19 Q. You are not a ballistics expert?

20 A. That's correct.

21 Q. You have no way of knowing what the right size of the cone
22 is without speaking to Mr. Haag about it?

23 A. That's correct.

24 Q. Okay. Then we have the blocking vehicles, and I believe
25 you testified that you purchased those. These are commercially

Terpstra - X

1 available models of vehicles that you used for this
2 environment?

3 A. Okay. Yes.

4 Q. Okay. And you go out and then we have people, and these
5 are also what you refer to as bipeds?

6 A. Yes.

7 Q. These are human beings that you can -- models of human
8 beings that you can manipulate like puppets and scale them to
9 an appropriate size?

10 A. Yes.

11 Q. And the sizes that you used, where did you get the
12 information for what size to use?

13 A. So that was provided to me by Special Agent Cunningham.

14 Q. And what information about their size, specifically,
15 did -- were you provided?

16 A. Their height.

17 Q. Anything other than their height?

18 A. I believe that's it.

19 Q. And was the height -- do you know what the source of the
20 data for that height was?

21 A. I don't.

22 Q. Do you know whether the height is as it's recorded on
23 their driver's licenses, for example?

24 A. I don't.

25 Q. Do you know whether it was measured while they were or

Terpstra - X

1 weren't wearing shoes or combat boots?

2 A. I do not.

3 Q. Do you have any other body measurements beside height?

4 A. No.

5 Q. Finally, we have the incident site, which we've heard you
6 testify you went out to the scene north of Burns, you set up
7 your 3D laser scanners, and you took a scan of the entire scene
8 a year and a half after this incident took place; correct?

9 A. Yes.

10 Q. All right. And that's what you described as point cloud
11 data. With how many million points did you say?

12 A. I think it was around 192 million 3D data points.

13 Q. These scanners have a demonstrated accuracy; correct?

14 A. Correct.

15 Q. What is that accuracy, if you know?

16 A. Generally accepted, plus or minus 2 millimeters.

17 Q. Is that for each of the scanners we've heard about, the
18 ones from the scene as well as the ones from Mr. Finicum's
19 truck?

20 A. So I won't speak to the accuracy of Mr. Haag's Leica
21 scanner. I'm not sure what specific model or what the accuracy
22 levels are for that; but for the scanner in this photograph
23 that's still up on the screen, the FARO Freestyle Object, that
24 one, I believe, has a plus-or-minus-half-a-millimeter accuracy
25 rate.

Terpstra - X

1 Q. And what about the other scanner that you used in addition
2 to the handheld scanner?

3 A. So that's --

4 Q. You said you used two.

5 A. Sorry. So that one was the FARO Focus X330, and that one
6 is the plus or minus 2 millimeters.

7 Q. All right. So fair to say now what we just described
8 together are the ingredients for what you later are going to
9 combine together into the camera matching process? We have the
10 vehicles, we have the people, and we have the scene. And then
11 later you're going to go in and you're going to place these
12 people and vehicles into your scene in a certain way?

13 A. Yes. I believe that's fair to say.

14 Q. Now, you testified on direct that you were able to
15 calculate a photogrammetry solution in this case. Did I write
16 that down correctly?

17 A. I don't know if I used the word "calculate."

18 Q. Would you use the word "calculate"?

19 A. I was able to achieve a photogrammetry solution.

20 Q. All right. Some effort was made to explain that you used
21 a computer to do this.

22 A. Yes.

23 Q. Is that correct?

24 A. That's correct.

25 Q. And is the reason why you're pushing back on "calculate,"

Terpstra - X

1 when I describe the method that you're using for placing these
2 models of people and models of vehicles into the scene, is that
3 the computer is not actually calculating the position of where
4 those things should go?

5 A. I would say, yeah, two things; one, that it's not -- the
6 computer is not calculating where they should go; and then,
7 two, I just didn't use the word "calculate."

8 Q. Fair enough. And you would not use the word "calculate"?

9 A. I -- I just did not.

10 Q. So this is, in fact, a procedure where you are -- well,
11 there's two steps to this, as I understand it. You first have
12 to create a virtual camera?

13 A. Yeah.

14 Q. And that's what we saw earlier. The field of view that
15 you have, how it is that you're looking at the scene; right?

16 A. Yes.

17 Q. And then you have to move that virtual camera in such a
18 way that to you it looks like it lines up with the particular
19 photograph?

20 A. Yes.

21 Q. The computer is not telling you you have achieved --
22 you've achieved a match, you've lined it up correctly; right?

23 A. Correct.

24 Q. That's you?

25 A. That's correct.

Terpstra - X

1 Q. You are the only one that can tell us does it line up;
2 does it not line up?

3 A. No. I wouldn't say I'm the only one.

4 Q. A human being, such as yourself, doing this, is the only
5 person that can do that?

6 A. I would not even say "doing it." But, yeah, I would say
7 other humans are capable of --

8 Q. What about what you did in this case? What did you
9 actually do in this case to place these virtual cameras?

10 A. Are you asking me if I placed the cameras or --

11 Q. Did you place the cameras?

12 A. I placed some of the cameras.

13 Q. And your colleagues placed other ones?

14 A. That's correct.

15 Q. So not all three of you placed all of the different camera
16 positions?

17 A. Are you asking if each one of the three people that worked
18 on this project placed each one of the cameras individually?

19 Q. I'm asking if all three of you got together and agreed for
20 every one of the 12 different camera positions.

21 A. So rather -- regardless of who did the match, was there an
22 agreement between the three of us that there was a match?

23 Q. I'm asking who did the match.

24 A. Okay. Multiple people.

25 Q. Multiple people. Some people did some matches; some

Terpstra - X

1 people did other matches?

2 A. That's correct.

3 Q. But, again, these are human beings doing this in every
4 instance?

5 A. Yes.

6 Q. This is not the computer doing it?

7 A. No.

8 Q. Okay. That's all I'm asking.

9 So once you have placed the camera in the right position,
10 the next step is to place the objects in the scene; correct?

11 A. That's correct.

12 Q. And the objects that I'm describing here are, again, the
13 vehicles and the people?

14 A. Yes.

15 Q. All right. You're lining the camera up based on things
16 that are there when you go out there to scan a year and a half
17 later and that were also there in the photograph?

18 A. That's correct.

19 Q. But since a year and a half later you don't have the
20 people and you don't have the vehicles, that's what you're
21 placing into the 3D environment?

22 A. Yes.

23 Q. In fact, the goal of this entire process is to try to
24 locate where those people and where those vehicles are in
25 three-dimensional space based on a photograph?

Terpstra - X

1 A. Yes.

2 Q. And then once you've done that, you have a 3D model, and
3 you can move it around as you showed us on direct examination?

4 A. Correct.

5 Q. And look at it at other vantage points that no one was
6 around to take a picture of a year and a half prior to when you
7 did all your scanning?

8 A. Yes.

9 Q. Have I accurately summarized in broad strokes what you did
10 in this case?

11 A. As it pertains to the camera matching?

12 Q. Yes.

13 A. I believe so.

14 Q. So on direct examination you've referred to what this --
15 to this process as camera matching photogrammetry.

16 Sir, you're not a photogrammetrist; correct?

17 A. That's correct.

18 Q. You are not a member of the American Society of
19 Photogrammetry and Remote Sensing, are you?

20 A. You know, I may be a member. I can't recall. But I
21 don't -- I'm not a certified photogrammetrist.

22 Q. If you are a member of the American Society of
23 Photogrammetry and Remote Sensing, is that true that that
24 membership is not on your CV anywhere?

25 A. That's correct.

Terpstra - X

1 Q. You don't hold yourself out to be an expert or a
2 professional photogrammetrist?

3 A. Not in the terms that -- like a certified
4 photogrammetrist, no.

5 Q. That is a thing, though; right? There are professional
6 photogrammetrists; right?

7 A. Yes.

8 Q. There are people that do this for a living. There are
9 photogrammetrists?

10 A. Yes. Certified photogrammetrists?

11 Q. Yes. And you are not one of these people?

12 A. I am not a certified photogrammetrist.

13 Q. So you're not purporting to calculate, using analytic
14 photogrammetry, where that camera should go, for example?

15 A. Yes.

16 Q. You are not here to tell us that you have calculated using
17 analytic photogrammetry where the people and the vehicles go?

18 A. Not using analytical photogrammetry, yes.

19 Q. Now, there have been some experiments, and we've talked
20 about one of them. I'm going to go back to the experiment that
21 we talked about at the beginning of this examination. There
22 have been experiments that have tried to study whether this
23 technique of camera matching is actually accurate. That's your
24 understanding, right, that there have been studies about that?

25 A. Yes.

Terpstra - X

1 Q. And this Tandy study -- is that the right way to refer to
2 it? It was a study done by a firm called Tandy. Is there
3 another way I should refer to that study?

4 A. I believe the first author is Coleman, but --

5 Q. So the Coleman study?

6 A. Coleman or Tandy, sure.

7 Q. And if you hear me refer to it as "Tandy," just know I'm
8 referring to the Coleman study.

9 A. No problem.

10 Q. So this Coleman study, that is one of the studies that you
11 understand examined camera matching to try to tell, hey, how
12 accurate is this?

13 A. I'm sorry. You're saying I examined the paper to
14 ascertain whether or not -- or how accurate camera matching is?

15 Q. I'm asking if it's your understanding that the Coleman
16 study did that analysis.

17 A. Yes.

18 Q. Can we bring up Tab 2 at page 6, please.

19 All right. So this -- the Coleman study, as you
20 understand it -- or as I understand it, is a simulated crash
21 scene with a motorcycle crashing, and there's a whole bunch of
22 evidence strewn all over a hill. There's a picture of where
23 that evidence was, and we're trying to put those pictures
24 together to figure out the location of the evidence. Is that
25 your understanding of what is being described here?

Terpstra - X

1 A. Yeah, I don't know. I guess the way you described it,
2 saying we're putting the photographs together to try to
3 understand the location, I don't -- I don't know if I would
4 phrase it that way, but I -- I think I understand what you're
5 getting at.

6 Q. So if we can flip to the next page, please.

7 So we have a photograph here. We have -- we have
8 different photographs of this scene, and there's evidence
9 that's been strewn out all over the hill, and the goal of this
10 study is to try to compare different methods for determining
11 where that location -- where that evidence is located based on
12 these photographs; right?

13 A. I believe so, yes.

14 Q. Okay. And it's an experiment, though; right? So we can
15 scan -- in fact, the authors of this study use laser scanners
16 to scan where these objects were actually located.

17 MR. FRANCIS: We can go back. Sorry. If we can go
18 back to page 7.

19 MS. OAKLEY: Yeah.

20 BY MR. FRANCIS: (Continuing)

21 Q. They could use laser scanners to scan where these objects
22 are actually located. So they know the right answers, don't
23 they?

24 A. Correct.

25 Q. And so you can study, therefore -- if you know the right

Terpstra - X

1 answer of where an object is located, you can study how well
2 camera matching or some other technique, how well -- how
3 accurate of an answer does that give you; right?

4 A. Correct.

5 Q. You can figure out how much of an error there is between
6 where camera matching says this object is and the right answer,
7 where it actually is; correct?

8 A. Yes. I believe that's what they're doing in this paper.

9 Q. Now, this is one project, one scene, with four different
10 photographs; correct?

11 A. I'm not sure. Are you saying that they are using --

12 Q. I'm going to represent to you that we've got this
13 photograph here -- one, two, three -- and if we can go back one
14 page -- four photographs and a number of different objects. We
15 have a motorcycle. We have a helmet. We have some -- some
16 simulated tire treads over here. If we flip forward one page,
17 we have a crash test dummy here, a motorcycle here.

18 Do you see all that?

19 A. I do.

20 Q. All right. Is it your understanding that the error rate
21 that was found for camera matching photogrammetry in this
22 study, for this scenario, was something other than zero?

23 A. Yes.

24 Q. Would you also agree that it's different from photograph
25 to photograph?

Terpstra - X

1 A. Looking at the paper here -- do they break down the error
2 per photograph -- the differences?

3 Q. I believe they do toward the end. There should be a
4 chart --

5 A. Well, we don't --

6 Q. -- on page 19. If we could flip to that.

7 So my question is is the error rate different from
8 photograph to photograph?

9 A. Yes.

10 Q. Is it -- is it not true that the -- it's actually a
11 different error rate for every single individual object in each
12 photograph?

13 A. Yes.

14 Q. Mr. Terpstra, generally speaking, is there a single error
15 rate in the process of camera matching to find the location of
16 evidence?

17 A. Can you ask me that one more time?

18 Q. Is there a single error rate that we can apply -- that
19 camera matching says the object is here, but actually it could
20 be over here or it could be over here? And I'm moving my
21 hands, you know, left or right of it. Is there a single plus
22 or minus however many inches that we can apply to every
23 photogrammetry project?

24 A. No.

25 Q. To every camera matching project?

Terpstra - X

1 A. No.

2 Q. Excuse me. It's different from project to project, isn't
3 it?

4 A. Yes.

5 Q. It's different from image to image, isn't it?

6 A. It can be.

7 Q. And it's different from object to object within an image?

8 A. Yes.

9 Q. It can't be assumed that those are all the same?

10 A. I would agree with that. I think that there are some
11 assumptions that you can make, if you'd allow me to explain
12 that a little bit.

13 Q. Certainly. Go ahead.

14 A. So while you're saying you can't make the assumption that
15 from one object to another object you're going to have the same
16 error rate, the things that cause -- that cause errors in
17 camera matching are understandable insomuch that you can -- if
18 you know what the limitations of your photograph are -- for
19 instance, if I can explain the idea of standing on a roadway
20 with a photograph of, say, a vehicle on the side of the
21 roadway, giving it to somebody and saying, "Place this vehicle
22 based on this photograph on a diagram or on this map," right,
23 and then I have a photograph, an aerial photograph, of that
24 same vehicle, say, similar to what you would have from Google
25 Maps or something, but an aerial photograph of that, then --

Terpstra - X

1 and I said, "Which photograph would you like to use? Which
2 photograph do you think you could more accurately place this
3 vehicle with on a diagram," I think most people would
4 understand, yes, much easier to place it based on the aerial.
5 So that has to do with your angle of incidence or the
6 difference off the normal surfaces that your camera is when
7 it's taking that photograph.

8 So taking that into consideration, you -- there's certain
9 areas in the photograph that I think you could assume have the
10 same error rate. That's going to be similar in where they're
11 located.

12 So you may have a different error rate for something in
13 your foreground versus your background; but, for instance, if
14 you have a couple of objects in your mid-ground or, similarly,
15 a couple of objects in your background, as long as they're the
16 same distance away from the camera and they're resting on the
17 same surface, you can probably assume -- or I think it's
18 natural to assume that they're going to have the same or very
19 similar error rate.

20 Q. And you're using words like "probably assume" or
21 "naturally assume." We're not calculating an accuracy rate
22 here; correct?

23 A. Well, if you -- I guess what I'm saying is if you
24 calculate the accuracy rate for one of those objects, I think
25 it's reasonable to suggest that you would expect a similar

Terpstra - X

1 accuracy rate for an object nearby, an object at a similar
2 distance.

3 Q. Mr. Terpstra, during your direct examination, you
4 described what you refer to as your range of certainty. Did I
5 hear that right?

6 A. Yes.

7 Q. And you would agree with me that what you are doing when
8 you describe your range of certainty is you are describing "How
9 far can I move this object in the scene and it still looks
10 right to me?"

11 A. Yeah. So how far can I move an object before it becomes
12 out of alignment.

13 Q. You would agree with me, sir, that that is different than
14 accuracy?

15 A. I'm sorry. How do you mean?

16 Q. So this is a range of values that I can place it and it --
17 they all look right to me. If I move it any farther than that,
18 it comes out of alignment. That is different than being able
19 to say this range of values represents the right answer. Those
20 are different concepts; correct?

21 A. Yes.

22 Q. What you're doing is precision. How precise is my answer?

23 A. Yes.

24 Q. And accuracy is dealing with how far away is my answer,
25 however precise it might be, from the right answer; correct?

Terpstra - X

1 A. Okay.

2 Q. Take a look again at the Coleman experiment in front of
3 you. That's Tab 2.

4 I want you to tell me if you agree that these are good
5 quality photographs.

6 A. I'm sorry. I have no way of answering that question based
7 on the -- the -- so this is a printed publication. All right.
8 So it's a representation of a digital photograph. It's been
9 shrunk down. It's been printed. I have no idea what the
10 resolution of this photograph is in its original format.

11 Q. Do you understand that the camera is -- here has been
12 placed relatively close to the objects being photographed?

13 A. It looks relatively close.

14 Q. It's not two miles away, is it?

15 A. I would agree with that.

16 Q. The cameras do not appear to be in -- to have been in
17 motion when these pictures were taken?

18 A. I don't see any reason why they would be.

19 Q. You don't see any visible blurring in these photographs,
20 for example?

21 A. Only when you're zooming in on here a little bit. But
22 that's going to be resolution on this printed photograph from a
23 publication, but yes.

24 Q. Fair enough.

25 A. I don't know what it's from. It's likely not from --

Terpstra - X

1 Q. You are familiar with this study; correct?

2 A. Yes.

3 Q. This is a study I pulled out of your report; correct?

4 A. Yes. I referenced it in my report.

5 Q. So you have read it. You are familiar with it enough to
6 cite it in your report as a reason why this Court should admit
7 your testimony at trial in this case; correct?

8 A. Yes.

9 Q. Okay. If we can go back to page 19, please, and if we can
10 zoom in just on the chart. You see here that these top two
11 boxes are dealing with camera matching?

12 A. Yes.

13 Q. And you see, sir, that even with the quality of evidence
14 that we have here, that we are still seeing error rates of
15 20 centimeters, 18.8 centimeters, 12 centimeters, nearly
16 14 centimeters, an average among everything of 12 and a half
17 centimeters.

18 Do you see that?

19 A. I do. You're highlighting areas under direct-from-camera
20 camera match. The level right below that shows where lens
21 distortion has been removed.

22 Q. I am drawing your attention to the camera match without
23 lens distortion. You did not, in fact, remove lens distortion
24 from the FBI video frames, did you?

25 A. That's correct.

Terpstra - X

1 Q. Okay. So for the camera match where no lens distortion is
2 removed, we're seeing these kinds of error rates, aren't we?

3 A. Yes.

4 Q. In experiments where the camera is close and where the
5 images are not blurry?

6 A. That's correct.

7 Q. Did you add plus or minus 20 centimeters onto each of the
8 measurements in your final result?

9 A. I'm sorry. Plus or minus 20 centimeters?

10 Q. For example, did you add plus or minus 20 centimeters?
11 Did you add plus or minus 12 and a half centimeters? Did you
12 add any of these values onto your final result as an error
13 range?

14 A. No.

15 Q. Even the smallest of these numbers, did you add any of
16 these numbers onto your final result as an error range?

17 A. No. I did not add any numbers based on this study to
18 my --

19 Q. Did you add any numbers based on any study as a
20 plus-or-minus error range for accuracy?

21 A. I would say just the case itself.

22 Q. Which we've already talked about its precision and not
23 accuracy; right?

24 A. I guess so.

25 Q. Your error range that you gave, that's the only thing that

Terpstra - X

1 you gave. There's no accuracy error bars that you're throwing
2 into your results here; is that correct?

3 A. That's correct.

4 Q. If we could go to Tab 7, please. What are we looking at
5 here?

6 A. Okay. This is a camera match photograph that was used for
7 camera matching with the scan data overlaid.

8 Q. Okay. The pixelation we're seeing on the road, does that
9 tell you this is one of the images with your point cloud data
10 overlaid on top?

11 A. Yes. I believe the pixelation that you're referring to
12 are individual 3D points in the scanner.

13 Q. Individual? All right. If we can flip to the next page.

14 So I want to ask you some questions about the blocking
15 vehicles.

16 Do you know what I'm talking about?

17 A. I'm not sure.

18 Q. So the vehicles that were set up as roadblocks. So
19 there's one right here, and there's another one right here that
20 I've just circled.

21 Do you see those?

22 A. Yes.

23 Q. All right. Now, in your model, you can make these
24 vehicles touch the ground; correct?

25 A. That's correct.

Terpstra - X

1 Q. Did you, in fact, make these vehicles touch the ground?

2 A. Yes.

3 Q. And in a 3D environment, you know where the ground is
4 because you scanned it?

5 A. That's correct.

6 Q. And we can see in the image that they appear to be
7 touching the ground as it existed back in January of 2016?

8 A. Yes.

9 Q. Is this called intersecting? You're making it so that the
10 model of the truck intersects with the scan surface of the
11 ground?

12 A. Yes. I don't -- I don't have a problem with that term.

13 Q. All right. Now, so, as I recall, the experimenters in the
14 Coleman study did the same thing; right? They placed evidence
15 in places where it was touching the ground?

16 A. Okay.

17 Q. Is that your recollection, or do you need me to show that
18 to you?

19 A. You're saying the pieces of evidence that they placed are
20 not suspended. They're on the ground?

21 Q. That's my question.

22 A. Yes. Thank you.

23 Q. Okay. Now, that is not the case for Mr. Finicum's truck.
24 It is not touching the ground; correct?

25 A. I believe that's true.

Terpstra - X

1 Q. It's in a pile of snow?

2 A. Correct.

3 Q. That snow was obviously not there in the exact proportions
4 and dimensions a year and a half later when you went out to
5 scan the scene?

6 A. That's correct.

7 Q. If we could go to Tab 8, please.

8 Now, we've seen -- we've seen this image before, and we've
9 heard testimony that this represents the position of
10 Mr. Finicum's truck as it was in the snow some nine hours after
11 round five was fired.

12 Were you here in court when that testimony was elicited?

13 A. Yes, I believe so.

14 Q. Now, this snow right here -- this snow right here, that
15 wasn't there when you went out to the scene a year and a half
16 later?

17 A. That's correct.

18 Q. So if I go into your 3D model to look at it, Mr. Finicum's
19 truck is going to look like it's floating in the air?

20 A. I believe so.

21 Q. If we can flip to the next page of this same tab. Of
22 course these are not going to line up precisely, but this is
23 the way the scene looked when you went out a year and a half
24 later. This is you right here?

25 A. Yes.

Terpstra - X

1 Q. You see how the road surface goes down from the -- the
2 ditch goes down from the road?

3 A. I do.

4 Q. All right. Flip back -- flip back a page, please. See
5 how it goes up?

6 A. Yes.

7 Q. And that's why when we look at Mr. Finicum's truck in your
8 model it's going to look like it's floating in the air because
9 it's on that pile of snow?

10 A. I believe it is on the snow, yes.

11 Q. It is certainly not touching a surface that you scanned
12 with your 3D scanners a year and a half later?

13 A. I believe that's true.

14 Q. Well, do you believe that's true, or is that actually
15 true?

16 You have your model in front of you. Is Mr. Finicum's
17 truck touching a surface that you scanned in your model?

18 A. No, I don't believe so.

19 Q. If we can go back to Tab 2, page 5. Going back to the
20 Coleman study, if we could zoom in on step 10.

21 So from the procedure for camera matching to point cloud
22 data that's outlined in the Coleman study, I'm reading here,
23 "Note that the method will only work for the points where the
24 evidence interacts with a scanned surface (the ground, walls,
25 curbs, etc.) For example, an attempt is made to trace a

Terpstra - X

1 helmet, the top of the helmet will be projected several feet
2 behind the actual back edge of the helmet similar to the
3 distortion seen with the helmet in Figure 6. You can only
4 trace the interaction area between the evidence and the scanned
5 surface."

6 Did I read that correctly?

7 A. Yes.

8 Q. So when it comes to the placement of Mr. Finicum's truck,
9 you are not actually following the methodology that was
10 outlined in the Coleman paper.

11 A. In other words, I'm not tracing?

12 Q. Correct.

13 A. Correct.

14 Q. Are you aware of any of the articles that you have cited
15 in your report that describe the technique of placing objects
16 in a way where they are floating?

17 A. I'm sorry. In a way where the objects are floating?

18 Q. Yes.

19 A. No.

20 Q. Are you aware of any study that examines the accuracy of a
21 technique that places objects into a 3D scene where the objects
22 are floating?

23 A. Yes.

24 Q. Well, I'm sorry, sir. I thought you just said that none
25 of the articles that you cited in your report, as backing up

Terpstra - X

1 the technique you used in this case --

2 A. Sure.

3 Q. -- describe a technique of floating.

4 A. So the articles I have in -- or the publications I've
5 referenced in my report pertain more to photogrammetry of a
6 scene. We -- photogrammetry can be used to determine vehicle
7 information as well. In fact, in the accident reconstruction
8 community, it's often used to determine the amount of crush on
9 vehicles, in which case those crush lines are, in fact,
10 floating. They're -- they're separate from the ground plane.

11 Q. And is that considered camera matching, the articles that
12 you've described, or is that considered something else?

13 A. No, that would be camera matching.

14 Q. Mr. Terpstra, do you believe that you have applied the
15 camera matching technique correctly in this case?

16 A. I do.

17 Q. Do you believe that the way that you have applied this
18 technique gave you accurate results?

19 A. I do.

20 Q. You would agree that it is important to select the right
21 frame before you start your analysis; correct? The right frame
22 of video. Let me be more clear.

23 A. Yeah. I -- it's important to choose correct images,
24 correct frames. I don't know what you mean by "the right
25 frame," necessarily.

Terpstra - X

1 Q. Well, for example, during your direct exam, you were
2 careful to take the stand and point out a nine-frame error that
3 you made --

4 A. Okay.

5 Q. -- in -- in this case.

6 You thought that was important enough to point out to all
7 of us at the very beginning of your direct exam?

8 A. Yes.

9 Q. And photogrammetry, in fact, is analyzing the locations of
10 people and places based on where they are in an image; correct?

11 A. Yeah. I don't know if I'd use the term "analyzing"; but,
12 yeah, you're determining locations where you're able to take
13 measurements and photographs. There's -- you know, what
14 photogrammetry is is defined differently, I suppose, but yes.

15 Q. You're trying to figure out where things are based on
16 where -- based on an image?

17 A. Yes. Correct.

18 Q. So having the right image is important; right?

19 A. The right image, images, yeah. I mean, if your object is,
20 for instance, not in the photograph, that would not be a good
21 choice to use.

22 Q. Well, and more -- more specifically, if you are analyzing
23 the location of people and objects in some other image, that's
24 a different analysis, isn't it?

25 A. Say that again. I'm sorry.

Terpstra - X

1 Q. I'm -- I'll move on, Mr. Terpstra.

2 MR. FRANCIS: If we can bring up the video folder,
3 please.

4 MS. OAKLEY: Let me take control a second.

5 MR. FRANCIS: And if we can bring up the second one,
6 please.

7 (Video playing.)

8 BY MR. FRANCIS: (Continuing)

9 Q. Do you recognize this video?

10 A. Yes.

11 Q. What is this video?

12 A. I believe this is a video that's been -- so we're looking
13 at two different videos at once. We're looking at a video shot
14 inside the cab of Mr. Finicum's truck, I believe by Ms. Cox.
15 We're also looking at one of the fixed-wing aircraft videos. I
16 believe this particular video that combines them or syncs the
17 two of them together was done by Mr. Piazza.

18 Q. That's my understanding as well.

19 A. Okay.

20 Q. So if -- and if we've been referring to the large video as
21 the FBI video and the small video as the Cox video, would you
22 know what I'm talking about?

23 A. Yes.

24 Q. All right. So I'm going to advance this. I'm going to
25 advance this frame by frame here.

Terpstra - X

1 (Video played.)

2 BY MR. FRANCIS: (Continuing)

3 Q. What are we seeing in the Cox video right now?

4 A. So in the Cox video, again, we're looking at it from the
5 interior of the cab, looking outward through a window. We see
6 people in the foreground. Someone in the foreground has ducked
7 or is bending over. We see near the roof of the vehicle
8 there's what appear to be sparks.

9 Q. Is this your understanding of the frame of video that
10 corresponds with the time that a shot entered the roof of
11 Mr. Finicum's truck?

12 A. Yes, that's my understanding.

13 Q. Is it your understanding that the FBI video is showing the
14 correct frame of video from the FBI video that corresponds with
15 when round five was fired?

16 A. Yes. I believe this is the correct video for the
17 alignment that Mr. Piazza did, yes.

18 Q. This is correct to what Mr. Piazza did. And that's an
19 important distinction to make, and we'll touch on that in a few
20 minutes.

21 And if you look at Tab 19, would you agree that we're
22 looking at just an image screenshot of the same pair of video
23 frames? Now the computer as switched over as well.

24 MR. FRANCIS: Ms. Oakley, can you switch the monitors
25 back to the video, please.

Terpstra - X

1 THE WITNESS: Yes.

2 BY MR. FRANCIS: (Continuing)

3 Q. You agree that that's the same?

4 A. I would.

5 Q. That is the video frame that Mr. Piazza says actually
6 shows the FBI video at the time round five was fired?

7 A. Yes.

8 THE COURT: Will you please play the audio part of
9 that?

10 MR. FRANCIS: Certainly, Your Honor.

11 Your Honor, I'm going to back it up slightly.

12 THE COURT: That's fine.

13 MR. FRANCIS: I can slow it down as well. So I'm
14 going to slow it down to half speed.

15 THE COURT: See, the audio wasn't played earlier.

16 (Video played.)

17 THE COURT: Just keep it going.

18 MR. FRANCIS: I'm going to back it up to the frame
19 that we're talking about here because I would like to ask you
20 some questions. All right.

21 (Video played.)

22 BY MR. FRANCIS: (Continuing)

23 Q. I'm going frame by frame now until the Cox video shows
24 those sparks that we saw before. Do you agree with that?

25 A. Yes.

Terpstra - X

1 Q. All right. So, again, you agree that this is the right
2 sync, at least as far as Mr. Piazza is concerned?

3 A. To my knowledge, yes.

4 Q. Your model that's documented in your report purports to
5 show the positions of Mr. Finicum's truck and each of the
6 individuals at the time that round five was fired?

7 A. Yes.

8 Q. If we could bring up page -- Tab 1, page 5. And if we can
9 zoom in on everything from the top down to the caption.

10 And this reads, "Figure 5 is a still image from
11 Mr. Piazza's synchronized video. The point in time what this
12 still frame depicts is the same time when round five is fired.
13 It depicts positions of the various parties and vehicles
14 visible at the time when round five is fired."

15 Did I read that correctly?

16 A. Yes.

17 Q. And at the bottom, the caption reads, "Retained Expert
18 Mr. Piazza's synchronized video with positions of parties and
19 vehicles visible in the FBI aircraft video."

20 Did I read that correctly?

21 A. Yes.

22 Q. And as you've already testified, none of that is true.
23 This is not, in fact -- this image does not, in fact, depict
24 the time that round five was fired?

25 A. Yes.

Terpstra - X

1 Q. This image does not, in fact, depict the positions of the
2 various parties and the various vehicles at the time that round
3 five was fired?

4 A. Yes.

5 Q. And the combination of these two images together is not,
6 in fact, Mr. Piazza's synchronized video?

7 A. Yes.

8 Q. But this, in fact, is the image that you used throughout
9 your entire analysis to represent the time that round five was
10 fired?

11 A. That's correct.

12 Q. And it's the wrong image?

13 A. Yes.

14 Q. If we could go to Tab 26, please. Figure 25.

15 You notice that the caption reads, "Figure 25. Camera
16 matching process" -- and then we have a Bates number -- "at
17 round five."

18 Did I read that correctly?

19 I've skipped over the -- the Bates number is WJA 0009936
20 at round five.

21 Do you see that?

22 A. Yes.

23 Q. And there's an image showing the position of various
24 vehicles and people?

25 A. Yes.

Terpstra - X

1 Q. This is not, in fact, the position from round five?

2 A. That's correct.

3 Q. If we could go to the next page. At the bottom of this
4 page you'll see 3D environment. Positions at the time when
5 round five was fired. That is not accurate either, is it?

6 A. No, it's not.

7 Q. This is not, in fact, the position of these objects at the
8 time that round five was fired?

9 A. No.

10 Q. If we could go to Tab 24, please. Top of -- flip the
11 page, please. Top of the second paragraph. Right here.

12 Mr. Terpstra, were you aware that the government initially
13 maintained that Mr. Piazza's synchronization of these two
14 videos was off by a frame at most and likely less? Were you
15 aware of that?

16 A. I'm sorry. This is -- what page are we on here?

17 Q. I have it blown up on the screen. This is the second page
18 of Tab 24. I'm going to represent to you this is from the
19 government's filing in this case ECF No. 81.

20 A. Okay. Give me one second here. I'm sorry.

21 Yeah, I don't recall seeing this before.

22 Q. Do you recall knowing that information before?

23 A. I don't recall that, no.

24 Q. Are you aware that on Monday Mr. Piazza testified that his
25 synchronization could, in fact, be off by as much as plus or

Terpstra - X

1 minus 11 frames in either direction?

2 A. Mr. Piazza's testimony on Monday, you said?

3 Q. Yes. Are you aware that that is what he testified on
4 Monday?

5 A. No, I'm not.

6 Q. So if he has testified that he could be off as much as 11
7 frames in either direction, we have a total range of 23 frames.
8 Would you agree with that math?

9 A. Yes.

10 Q. And your model does account for an error rate that
11 Mr. Haag provided you for ballistics trajectory, doesn't it?

12 A. Yes.

13 Q. Plus or minus 5 degrees?

14 A. Yes.

15 Q. So even if you had used the correct frame of video
16 throughout your analysis to begin with, isn't it true that in
17 order to account for the plus-or-minus-11-frame error rate that
18 Mr. Piazza has now admitted, you would need to analyze where
19 all of these people and vehicles were throughout that entire 23
20 frames?

21 A. So his error rate was in his -- in his sync, he said his
22 error rate was plus or minus 11 frames.

23 Q. Mr. Piazza testified he could be wrong as much as 11
24 frames.

25 A. And you're saying would I need to, then, analyze -- in

Terpstra - X

1 conjunction with the frame I've chosen, would I need to analyze
2 as much as 11 frames forward and backward of the ones I have
3 already analyzed to help establish the range of error in his
4 sync?

5 Q. No. To help establish the error of your final result.

6 A. I think his error range would probably need to be built
7 into the final model, yes.

8 Q. If there's errors in the inputs that you're using in your
9 model, those need to be reflected in the final answer, don't
10 they?

11 A. Yes.

12 Q. And your model does not, in fact, reflect that source of
13 error at all?

14 A. The plus or minus 11 frames? No.

15 Q. Mr. Terpstra, camera matching requires having things to
16 match up to, things that have not changed since the original
17 image was taken. Is that accurate?

18 A. Yes.

19 Q. If we could turn to Tab 9, please.

20 Would you please tell us what we're looking at here.

21 A. So this is an image from the software where we're seeing
22 both a photograph or an image from the frame underneath a point
23 cloud, and we're looking at this through a virtual camera.
24 This one's name is C04D.

25 Q. What did you use to align the point cloud to the image

Terpstra - X

1 that we're seeing here?

2 A. 3D Studio Max software.

3 Q. Sorry. Let me ask that again. Did you use the position
4 of trees to line these images up?

5 A. Yes.

6 Q. Did you use the position of the -- of fog lines?

7 A. Yes.

8 Q. How about lane markings?

9 A. Yes.

10 Q. Now, I think I heard you testify on direct that you --
11 that one of the things you relied on to achieve a camera match
12 was foliage and not simply tree trunks. Did I hear you
13 correctly?

14 A. It's a combination, but yes.

15 MR. FRANCIS: If we can go back -- we're going to
16 come back to this tab, but if we could flip back to Tab 2,
17 please. And at the end of the paper itself, of -- sorry. If
18 we can flip forward five or six pages. Two more pages.

19 Again, keep going.

20 Just keep flipping pages.

21 Right there, please.

22 All right. If we can blow this up, please.

23 BY MR. FRANCIS: (Continuing)

24 Q. You see here that the Coleman study describes some
25 features that work well for camera matching and lists corner

Terpstra - X

1 points, pavement seams, light poles, guardrails, bridges, items
2 in the background at great distance, tree trunks, but not
3 foliage.

4 Do you see that?

5 A. I do.

6 Q. If we can go back to Tab 9, please.

7 All right. So you said that one of the other things you
8 used was lane markings; right?

9 A. Yes.

10 Q. If the lane markings had somehow changed between when this
11 video was shot and when you took your scan data, would that
12 have affected your results?

13 A. Yes.

14 Q. By how much?

15 A. It depends.

16 Q. Do you know, sitting here today, how much it would have
17 changed?

18 A. You're saying if something had changed in an unknown
19 amount how much would it change my --

20 Q. Yes.

21 A. That's unknown as well.

22 Q. What was your understanding, in doing this project, as to
23 whether the lane markings had changed between January 2016 and
24 when you went out to the scene in November of 2017?

25 A. My understanding is that they were repainted, parts of it

Terpstra - X

1 were restriped, but the roadway itself was not resurfaced.

2 Q. Was it your understanding that when the lanes were
3 repainted that they were repainted in the same pattern?

4 A. Yes.

5 Q. Next page, please, of this same tab.

6 Do you see that part of the image that we put a circle on?

7 A. Yes.

8 Q. Next page.

9 Do you see that that circle is still aligned with the road
10 surface and now we've switched back with the original FBI
11 video?

12 A. I do.

13 Q. Do you notice a difference from the way that the scene
14 appeared back in January of 2016 to the way the pattern of the
15 lane markings was when you scanned it?

16 A. Yes. I noticed that as well.

17 Q. Can you flip to the next page. This is an image that was
18 taken in November of 2017 when you scanned the road surface;
19 correct?

20 A. Yes.

21 Q. This is you?

22 A. Yes.

23 Q. And this is that triple lane marking that we were seeing
24 before that wasn't there back in January of 2016?

25 A. Yes.

Terpstra - X

1 Q. Mr. Terpstra, would you agree that bad candidates for
2 camera matching include photos taken at great distances?

3 A. No.

4 MR. FRANCIS: If we can go to Tab 2, page 10, please.
5 And if we can blow up from here down to the end of that
6 bulleted list.

7 BY MR. FRANCIS: (Continuing)

8 Q. This is listing poor candidates for camera matching. And
9 it lists, as among poor candidates for camera matching,
10 "Photographs taken downhill or at great distances should also
11 be scrutinized for accuracy due to having less points to snap
12 to accurately."

13 Do you see that?

14 A. I do.

15 Q. And the last bullet, "Photographs taken at long zoom
16 lengths are harder to determine where the photographer was
17 standing and therefore harder to properly match."

18 Do you see that?

19 A. I do.

20 Q. Mr. Terpstra, the goal in camera matching is to place the
21 virtual camera in the same place as the actual camera that took
22 the picture with the same focal length; correct?

23 A. That's more a byproduct, I would say. The goal of camera
24 matching is to align your 3D representation, whether it's a 3D
25 model, a point cloud, survey data, to the photograph itself.

Terpstra - X

1 Q. But in the -- the step I'm talking about here is when
2 you're placing the virtual camera, your goal in correctly
3 placing that camera is to put that camera in the same place as
4 the original camera that shot the image; correct?

5 A. I wouldn't say that's my goal.

6 Q. You would not agree with that?

7 A. It's not my goal to achieve that. My goal is to achieve a
8 correct alignment with, again, the 3D model and the photograph
9 or video frame itself.

10 Q. If we can go to Tab 10, please, page 4. Sorry. If we can
11 go back to the first page of this, of Tab 10.

12 Do you recognize this paper?

13 A. Yes.

14 Q. Is this one of the papers that you cited in your report as
15 validating the technique that you used in this case?

16 A. Yes.

17 MR. FRANCIS: If we can go to page 4, please, at the
18 top of the page. First bullet point, if we can enlarge that
19 please.

20 BY MR. FRANCIS: (Continuing)

21 Q. This is outlining a procedure for camera matching.

22 "Create a camera in the computer model for the background
23 image. A guideline for placement is to consider the height of
24 the photographer. Place the camera approximately 5 feet
25 5 inches above the ground level."

Terpstra - X

1 Did I read that correctly?

2 A. Yes.

3 MR. FRANCIS: If we can go to the bottom of that same
4 page over in the right-hand column. That whole --

5 BY MR. FRANCIS: (Continuing)

6 Q. "When selecting the virtual camera settings, it is
7 recommended that a 50-millimeter lens be selected initially. A
8 50-millimeter lens most reasonably represents what the human
9 eye sees. However, oftentimes the camera used may have had a
10 zoom lens. If you are able to contact the photographer to
11 determine the setting, this could save you some time."

12 Did I read that correctly?

13 A. Yes.

14 Q. Are you also aware that the Coleman study outlines that
15 one of the first steps in doing camera matching is to figure
16 out the original focal length of the image that you're
17 analyzing; correct?

18 A. Yes.

19 Q. That's because you're going to start off by placing your
20 virtual camera in the same place with that same level of focal
21 length, that same zoom setting; right?

22 A. I'm sorry. Say that again.

23 Q. The reason why you want to know the focal length of the
24 camera that took the image is so that you can make your virtual
25 camera match that?

Terpstra - X

1 A. It's a good starting point.

2 MR. FRANCIS: If we can go to page 3 of Tab 2, and if
3 we can blow up the section Camera Matching to Point Cloud Data.

4 BY MR. FRANCIS: (Continuing)

5 Q. We're back on the Coleman study now, Mr. Terpstra.

6 The photogrammetry method that is the subject of this
7 paper involves camera matching directly to point cloud data.
8 Again, that's what you were doing; right?

9 A. A combination of point cloud data and total station data
10 as well, yes.

11 Q. And at the last sentence, "The user can then add a,"
12 quote, "'virtual camera' in the scene that matches the original
13 camera focal length, location, and target."

14 Did I read that correctly?

15 A. Yes.

16 Q. You did not do that, did you?

17 A. I would say, yes, I did, but it's -- it's difficult to
18 determine. So if I can clarify that?

19 THE COURT: You may.

20 THE WITNESS: The --

21 THE COURT: You can clarify any answer.

22 THE WITNESS: I appreciate that. So the previous
23 walk-through where we went through the line of sight with the
24 camera and the detail with both having a different field of
25 view and still aligning or matching to the scene, that whole --

Terpstra - X

1 that whole description and the time that's spent there goes
2 back to the idea that it doesn't necessarily matter that you
3 have the exact focal length location and target.

4 So it -- in fact, I've done studies myself where we've
5 surveyed cameras, as we've taken photographs of them, and
6 determined how close we were able to match and align back to
7 those same cameras. Those are all terrestrial cameras.

8 But I don't know if I answered your question for you.
9 Sorry.

10 BY MR. FRANCIS: (Continuing)

11 Q. You actually didn't, Mr. Terpstra. My question wasn't
12 whether or not you think it matters that you put the camera in
13 the wrong place. My question was whether you put the camera in
14 the wrong place.

15 A. Okay. I'm sorry. I forgot the second part of what I was
16 going to say there.

17 Q. Could you first just answer my question?

18 A. Yeah, I'm going to. So why I said yes is because some of
19 the cameras, I believe, were -- will accurately match the focal
20 length location and target. Those will be the first three
21 cameras. Right? So the ones that were taken from the ground
22 level.

23 I believe those are going to be very accurate. Although,
24 it would be very difficult to determine there because they were
25 not surveyed and nobody measured where that photographer was

Terpstra - X

1 standing at the time; but those, I believe, will be very close,
2 based on studies I have done, to the focal length, location,
3 and target.

4 Now, the other ones, and I think the ones you are getting
5 at, the FBI videos, no.

6 Q. No, you did not put them in the right place?

7 A. No. They're not in the -- the location that's reported by
8 the -- the FBI video.

9 Q. Different location than where the plane actually was?

10 A. That's correct.

11 Q. And a different focal length than what the camera was
12 actually set to?

13 A. Yes. That's correct.

14 Q. If we can bring up Tab 11, please.

15 This is a screenshot from the demonstration that you were
16 just doing on direct examination that appears in the
17 government's brief; correct?

18 A. Yes.

19 Q. I believe it's ECF 87.

20 So the camera is supposed to be here. This is the
21 location of the FBI aircraft at the time of where Mr. Piazza
22 says shot five happened. You didn't use that one, but at the
23 time that Mr. Piazza says shot five happened, this is where the
24 FBI aircraft was?

25 A. No. Okay. You're saying Mr. Piazza, and that's not the

Terpstra - X

1 analysis that I've done to this point, where --

2 Q. Let me ask the question again.

3 A. Yep.

4 Q. Is this -- what I've just circled, is that the location of
5 the FBI plane at the time of shot five?

6 A. That's in my report at the time of shot five? Yes.

7 Q. And this is where you put the camera?

8 A. That's correct.

9 Q. The FBI video had a focal length of -- and it's a little
10 hard to see here, but 600 -- it's a 600-millimeter focal
11 length?

12 A. Yeah. 604.363 if I'm reading right.

13 Q. And your focal length was just over 400 millimeters?

14 A. Correct.

15 Q. Now, the height difference between where the plane
16 actually was and where you put the camera is approximately
17 1,700 feet; correct?

18 A. I haven't calculated that, but I'll take your word for it.

19 Q. All right. And have you calculated the distance in this
20 direction between those two cameras?

21 A. No, I have not.

22 Q. Would you take my word for it that it's in excess of
23 3,500 feet?

24 A. Yes, I would.

25 THE COURT: How much do you think you have to go?

Terpstra - X

1 MR. FRANCIS: Your Honor, I don't think I'll finish
2 by the time we would want to take a break, so if -- this might
3 be a good stopping point to take a break.

4 THE COURT: We've been here an hour and 50 minutes.

5 MR. FRANCIS: I have some more yet to go, Your Honor.

6 THE COURT: Thank you. We'll take a recess until
7 3:00.

8 (Recess taken.)

9 THE COURT: Proceed.

10 BY MR. FRANCIS: (Continuing)

11 Q. Good afternoon, Mr. Terpstra.

12 A. Hello.

13 Q. All right. So I'm going to return your attention to the
14 image that was in front of you before we took a break.

15 Now, you noticed that we were talking about your camera
16 match position had a focal length of 400 millimeters and the
17 camera of the FBI plane in this diagram had a focal length of
18 600 millimeters; correct?

19 A. Correct.

20 Q. And you recall we were also talking about how an
21 appropriate first step in the camera matching process is to try
22 to find out the focal length of the camera that was used to
23 take the image under consideration.

24 Do you recall that?

25 A. I do recall that.

Terpstra - X

1 Q. Now, you actually had the focal length of the FBI video
2 camera at the time that round five was taken and .3 seconds
3 prior to when round five -- when Mr. Piazza said that round
4 five was fired. You had that focal length available to you
5 before you did your analysis, didn't you?

6 A. The focal length?

7 Q. Yes.

8 A. I believe so.

9 Q. If we could bring up Tab 3, please. This is the image
10 that you say, or at least you said in your report, corresponded
11 with shot five; correct?

12 A. That's correct.

13 Q. And what is this number right here that I'm circling?

14 A. It is now my understanding that that is the focal length.

15 Q. That is now your understanding that that is the focal
16 length?

17 A. That's correct.

18 Q. You had that data available to you before you began your
19 analysis; correct?

20 A. I did, but I did not know what that number was.

21 Q. Did you ask what the numbers on this image were or meant?

22 A. Not prior to writing my report.

23 Q. Did it occur to you that they might be important?

24 A. Yes, I'm sure those -- the numbers on this video are
25 important.

Terpstra - X

1 Q. Do you now know, for example, that using the numbers on
2 this video you could come up with the altitude of the airplane?

3 A. I do, indeed.

4 Q. Do you now know, after looking at this -- do you now know,
5 by looking at this frame of video, that you could determine the
6 altitude of the ground where the crosshairs are?

7 A. Yeah. It has a target distance. I don't know that it
8 lists the altitude at the target.

9 Q. Do you see this number right here?

10 A. I do.

11 Q. Do you see the -- is it your understanding that that
12 number represents the number of feet above sea level for the
13 target indicator?

14 A. Yeah. I don't know if it's for the target or if it's
15 directly below the aircraft; but, yes, I -- either way it's
16 going to be pretty similar.

17 Q. Either way you could use that information to -- to figure
18 out the altitude of the aircraft above the ground?

19 A. Approximately, yes.

20 Q. Again, the altitude that you used for your virtual camera
21 was wrong?

22 A. Yes.

23 Q. Now, the articles that you cite in your own report discuss
24 getting the focal length right and they discuss the distortion
25 in an image that can happen if you don't get it right. Would

Terpstra - X

1 you agree with that statement?

2 A. I'm not sure. Could you direct me to that page real quick
3 so I can refresh?

4 Q. Certainly. And I'm going to do that. Actually, it
5 occurred to me you actually mentioned this on direct, as well,
6 didn't you? So I recall that you had this -- you had this line
7 of sight, and you pulled the camera out, and we see what it --
8 what happens to the image; and then we push the camera in, and
9 we see what happens to the image.

10 A. Yes.

11 Q. Do you recall that testimony?

12 A. Yes, I do.

13 Q. Do you recall testifying that when we moved the camera in
14 past a certain point that even when you adjusted the focal
15 length to compensate the fact that we're now too close, there's
16 a distortion in the image? Not everything lines up the way
17 it's supposed to?

18 A. I don't know if I'd agree with distortion. You're unable
19 to achieve an alignment when you get too close.

20 Q. Are you familiar with a term "perspective distortion"?

21 A. I am.

22 Q. Is what we're seeing, as you go in and out from the
23 target, an example of perspective distortion?

24 A. Yes.

25 Q. Okay. Now, so you would agree, then, that not every point

Terpstra - X

1 along that line of sight is the same. We can't just pick an
2 arbitrary distance away from the scene, change the focal length
3 somehow, and come up with an identical image?

4 A. The -- so the first part was I would agree that not every
5 point along that line we could achieve a consistent image? If
6 that's true -- if that's your statement or question, I would
7 say, yes, not every point along that line.

8 Q. My question was is every point along that line going to
9 give you an identical image if all you do is pick an arbitrary
10 distance away and then just adjust the focal length to
11 compensate?

12 A. No.

13 MR. FRANCIS: If we could go to Tab 10, please,
14 page 4. If we can zoom -- zoom in from right here to the end
15 of that bullet.

16 BY MR. FRANCIS: (Continuing)

17 Q. Based on the observed -- I'm sorry. I represent to you
18 this is -- you've seen Tab 10 before. This is one of the
19 articles that is cited in your report --

20 A. Yes.

21 Q. -- that validates the accuracy of the methods you used in
22 this case?

23 A. Yes.

24 Q. "Based on observed discrepancies between the perspective
25 of a the photograph and perspective of the computer scene,

Terpstra - X

1 adjust the focal length and vanishing point of the camera
2 accordingly. If the objects look stretched when matched to the
3 photograph, increase the focal length and move the vanishing
4 point away. If the objects look squished, decrease the focal
5 length and bring the vanishing point closer."

6 Does it say that?

7 A. Yes.

8 Q. If we could go to the bottom of this page over in the
9 other column.

10 From -- one moment, sorry.

11 This entire -- yes, thank you.

12 All right. And beginning from -- beginning from right
13 here: "The position and rotational values were relatively easy
14 to adjust, however the camera's focal length was the most
15 difficult parameter to adjust correctly."

16 Did I read that correctly?

17 A. Yes.

18 Q. And I think we've already read the part that comes next
19 that discusses that you should start by selecting a
20 50-millimeter lens and that you should go and ask the
21 photographer what focal length he used.

22 Do you recall reading that portion?

23 A. I do.

24 Q. Okay. If we could jump to the part after that.

25 "Through trial and error, you will notice that as the

Terpstra - X

1 camera's focal length is changed from 50 millimeters to
2 28 millimeters, objects in the scene become distorted. In this
3 case, the lane stripes became shorter and did not match up with
4 the lane stripes in the photograph in the background. As the
5 focal length was changed from 50 millimeters to 80 millimeters,
6 the lane lines became longer and still did not match up
7 correctly. After modifying the focal length and adjusting the
8 camera position and rotation, the computer model eventually
9 matched the photographic background."

10 Do you see that?

11 A. I do.

12 Q. Now, this is discussing adjusting the focal length by
13 22 millimeters in one direction and 30 millimeters in the other
14 direction; correct?

15 A. Yes.

16 MR. FRANCIS: If we could go to Tab 2, please.
17 That's the Coleman experiment. Page 5. And if we could zoom
18 in on Step 7.

19 BY MR. FRANCIS: (Continuing)

20 Q. So this is describing the situation after you have used
21 the metadata from the photo to find the focal length from the
22 original photograph. One of the steps you might do after you
23 use that as your starting point, as you testified, is "If
24 regularly spaced items such as guardrail posts do not line up
25 perfectly after a good camera match is obtained, the focal

Terpstra - X

1 length may need to be adjusted very slightly (plus or minus
2 .2 millimeters) and the camera repositioned."

3 Did I read that correctly?

4 A. Yes.

5 Q. Do you notice that it says that even after a, quote, "good
6 camera match is obtained," things may not align correctly?

7 A. I do see that.

8 Q. Do you also see that the way to correct that is to adjust
9 the focal length by small increments, plus or minus

10 .2 millimeters?

11 A. I do see it.

12 Q. Just to be clear, you were off by 200 millimeters;
13 correct?

14 A. Approximately.

15 Q. Is there anywhere in these articles, cited in your report,
16 that says it doesn't matter if you get these numbers right
17 because you can just pick any focal length you want and any
18 position you want as long as it's on the same line of sight?

19 Am I going to find something like that anywhere in these
20 articles?

21 A. Most likely not.

22 MR. FRANCIS: In fact, if we could flip to Tab 10 on
23 page 6 and if we can zoom in on the conclusion of this study.

24 BY MR. FRANCIS: (Continuing)

25 Q. Isn't it true, sir, that the accuracy of camera matching

Terpstra - X

1 depends on the ability of the user to accurately place the
2 camera in the correct position with the correct focal length?

3 A. I'm sorry. Did you ask if you read that correctly or if
4 that's my understanding of the paper?

5 Q. Did I read that correctly?

6 A. I'm sorry. Yes.

7 Q. And I understand it's your position that this doesn't
8 matter. Right?

9 A. Yes. I mean, some of that, of course, matters; but in
10 regards to the demonstration I showed earlier, yes, as long as
11 you're along the same line of sight, you can adjust -- it's a
12 unique case.

13 Again, if I can extrapolate a little bit.

14 THE COURT: Of course.

15 THE WITNESS: It's a unique case, in which case you
16 are probably not going to find many instances where, one, other
17 experts may have run across this problem; or, two, decided to
18 conduct their own research and publish articles about it
19 because, simply put, there's not that much aerial photography
20 that's used in camera matching, right, because of the length of
21 the camera or the unusualness of the project. But probably the
22 best way to go about showing that would be a demonstration such
23 as the one earlier where you can see how it does or does not
24 affect. When you change a camera's position along its line of
25 sight, you can adjust the focal length at a certain point.

Terpstra - X

1 Obviously, at different areas it does matter. When you're
2 too close, as you stated, the perspective distortion; but in a
3 certain area, it doesn't matter. But hopefully that was clear
4 in the demonstration earlier.

5 Q. So did I hear you correctly that you just said this is a
6 unique case?

7 A. Yes.

8 Q. This is one that isn't necessarily going to have been
9 studied and documented in the literature?

10 A. I would say that's true.

11 Q. Mr. Terpstra, are you aware of the testimony of
12 Victoria Dickerson in this case? Has what she testified to
13 this week, about -- are you aware of what she testified to this
14 week?

15 THE COURT: That's too general. What are you
16 referring to?

17 BY MR. FRANCIS: (Continuing)

18 Q. Certainly. Are you aware multiple witnesses have
19 testified that Mr. Finicum's truck settled in the snowbank by
20 3 to 4 inches?

21 A. I'm not aware of that.

22 Q. Are you aware that after settling in the snow by 3 to
23 4 inches Victoria Dickerson measured the angle of that truck,
24 the roll angle of that truck, relative to gravity, at
25 approximately 14.45 degrees?

Terpstra - X

1 A. I'm not aware of that. I don't recall seeing that
2 previously or hearing her testimony. I was only here today.

3 Q. Even here today, you were -- you were not aware of that?

4 A. You are saying in testimony today she said that she
5 measured it by 14 and a half degrees.

6 Q. Let me ask the question another way.

7 A. Okay.

8 Q. Regardless of where you learned it, are you aware of these
9 facts that I'm telling you about, about what Ms. Dickerson
10 measured?

11 A. Yeah. I know she measured the roof. I don't know the
12 angle she came up with. That's not my recollection.

13 Q. You had access to that information; correct?

14 A. I'm not sure what she -- if you're saying she testified to
15 it earlier this week --

16 THE COURT: We're getting off, Counsel. Now, reframe
17 your question. Ask him to assume that as a fact, whether it's
18 a fact or not. You're just asking him to assume that as a
19 fact. What does that have to do with his opinion? Ask him
20 that.

21 MR. FRANCIS: Yes, Your Honor.

22 BY MR. FRANCIS: (Continuing)

23 Q. Mr. Terpstra, assuming that Ms. Dickerson's --

24 THE COURT: No, no, no. Just say assume that there
25 was X finding. Not who made it, not whether she testified, but

Terpstra - X

1 just what you are asking.

2 Follow me now.

3 BY MR. FRANCIS: (Continuing)

4 Q. Mr. Terpstra, assuming that 12 or 13 hours after round
5 five was fired Mr. Finicum's truck was measured at a roll angle
6 of 14.45 degrees. Isn't it true that your roll angle that you
7 found cannot be correct?

8 A. I'm sorry. You're saying so my roll angle is different
9 than her roll angle, and you're suggesting that mine cannot be
10 correct because of how she measured it. How many hours did you
11 say?

12 Q. To the contrary, sir. Actually, what I'm saying is that
13 they're the same. What was the roll angle that you came up
14 with?

15 A. Relative to gravity?

16 Q. Yes.

17 A. Is there --

18 THE COURT: Suggest it to him.

19 BY MR. FRANCIS: (Continuing)

20 Q. Is it approximately --

21 THE COURT: You're supposed to be -- on
22 cross-examination, you lead the witness. You tell them what
23 you're talking about. You don't ask them to go fish for
24 something.

25 ///

Terpstra - X

1 BY MR. FRANCIS: (Continuing)

2 Q. It was --

3 THE COURT: Go ahead.

4 BY MR. FRANCIS: (Continuing)

5 Q. It was your conclusion in your report that you wrote that
6 the roll angle was 14 degrees; correct?

7 A. I believe so. I -- I wouldn't mind if --

8 Q. I want you to be sure about this, so I'll give you an
9 opportunity to look at your report. It's in Tab 1 of the
10 binder in front of you.

11 A. Okay.

12 Q. And make sure you give an accurate answer to this Court.

13 THE COURT: Do you know, Counsel, what he said?

14 MR. FRANCIS: I can represent to the witness what his
15 report says.

16 THE COURT: Well, tell him.

17 BY MR. FRANCIS: (Continuing)

18 Q. Isn't it true that your report says the roll angle is
19 14 degrees?

20 A. Yes. I see that.

21 Q. All right. And assuming that we have multiple
22 eyewitnesses that testified that the truck settled by
23 3 to 4 inches and at 12 or 13 hours later it's measured at
24 14.45 degrees, those things can't both be true, can they?

25 A. You're saying a vehicle has settled a certain amount,

Terpstra - X

1 correct, and you're saying that we have two different
2 measurements or similar, as you've portrayed it, two
3 different -- or similar measurements of the roof angle, and
4 you're saying that because it's settled, those two cannot be
5 the same or congruent with each other.

6 Do I understand your question correctly?

7 Q. You don't. Let me ask it a more clear way.

8 If you can look at your monitor, please. Here is a level
9 ground.

10 A. Okay.

11 Q. You measured it at 14 degrees; correct? I'm -- that's not
12 actually 14 degrees, but we're going to pretend that's
13 14 degrees. All right?

14 A. Okay.

15 Q. All right. Over the course of 12 or 13 hours, there's
16 been testimony that the truck settled in a way that made it
17 flatten out. And then after that period of time the angle was
18 measured again. It should have been lower; but it, in fact,
19 was measured at 14.45 degrees. You would agree with me that
20 either the testimony that we've heard is incorrect or your
21 model is incorrect?

22 A. I'm not aware, I guess, of any testimony that says the
23 vehicle had flattened out.

24 Q. That wasn't my question. My question was assuming that
25 that testimony -- assuming that that was the testimony, either

Terpstra - X

1 the testimony is wrong or your model is?

2 A. Okay. You're saying assuming that the vehicle had settled
3 and flattened out, in other words, it would have had some roll
4 to flatten out, then those two measurements should not be the
5 same?

6 Q. Correct.

7 A. Yes.

8 Q. Let's talk about why that might be. The 12 images that
9 you used for your camera matching, they span a 20-minute time
10 period; correct?

11 A. I'm not certain of the time frame they spanned.

12 Q. If we could bring up Tab 16, please. Sir, isn't it true
13 that based on the metadata from officer three's Samsung
14 photographs those images were taken at approximately 4:54 p.m.
15 on January 26th?

16 A. Yes.

17 Q. And is it your understanding that round five occurred at
18 approximately 4:34 p.m. on January 26?

19 A. I guess I don't -- I don't recall the time. Is there a
20 time stamp on the FBI video as well?

21 Q. Will you take my word for it?

22 A. Okay.

23 Q. And assuming that the shot happened around 4:34 on
24 January 26th, and you have a -- this is an image, this officer
25 three Samsung image, this is an image you used in your

Terpstra - X

1 photogrammetry camera matching process; correct?

2 A. I believe so. All I see is a number in front of me, and I
3 don't recall the specific .jpg number, but --

4 Q. Would you accept my representation that that Bates number
5 for that .jpg is listed in your report as one of the images you
6 used?

7 A. Yes. Yes.

8 Q. Do you agree with me, then, that it's 20 minutes after the
9 time the shot was fired?

10 A. I would agree based on the exit data.

11 Q. Would you agree with me that only one of the images that
12 you used, you wrote in your report, happened at the time of
13 round five?

14 A. Yes.

15 Q. The one single image from the FBI plane?

16 A. That's correct.

17 Q. None of the -- the other 11 images are not from the time
18 round five was fired?

19 A. That's correct.

20 Q. And, in fact, we now know that none of the 12 images was
21 from the time that round five was fired.

22 A. Yes.

23 Q. Your analysis assumes that Mr. Finicum's truck remained in
24 the same position over the course of those 20 minutes, doesn't
25 it?

Terpstra - X

1 A. I believe it does.

2 Q. Mr. Terpstra, finally, I would like to discuss lens
3 distortion with you for a few minutes.

4 A. Okay.

5 Q. First, I would like to make sure we're all on the same
6 page about what we're talking about with lens distortion and
7 that I'm understanding the concept correctly.

8 If we could bring up Tab 12.

9 Is this an image showing different types of lens
10 distortion that we might see depicted in an image?

11 A. Yes. I believe this is from one of our papers.

12 Q. It's from a paper that you wrote, in fact, isn't it?

13 A. Yep. Yep.

14 Q. And the image on the left, that's an example of barrel
15 distortion; correct?

16 A. Yes.

17 Q. That is named that because it look like a sideways barrel;
18 right?

19 A. I suppose so, yes.

20 Q. And the one on the right is an example of pincushion
21 distortion?

22 A. Correct.

23 Q. If we could go to page 2, is this an example of what these
24 types of distortions might look like in practice? I apologize.
25 The top cropped a little bit.

Terpstra - X

1 A. Yeah. I guess I would just disagree with you on that
2 because the -- the left one appears to be a pincushion, but the
3 right one is going to be -- I guess you can see it here in the
4 caption.

5 Q. That's right.

6 A. The bottom right is going to be wavy, which is a
7 combination of both pincushion and barrel distortion.

8 Q. Thank you. You actually anticipated my question. So the
9 top one, the top left, you would agree, is without distortion;
10 and then the top right is barrel, bottom left is pincushion;
11 bottom right is wavy, which you just described is a combination
12 of both?

13 A. Correct.

14 Q. Okay. Now, these distortions affect the position of
15 pixels in an image; correct?

16 A. Yes?

17 Q. And they, therefore, affect the geometry that's
18 represented in that image?

19 A. Yes.

20 Q. Now, that's important for the process of camera matching
21 photogrammetry, isn't it?

22 A. It is.

23 Q. It's important for any photogrammetry process, isn't it?

24 A. I would say lens distortion should be considered for any
25 photogrammetric process, yes.

Terpstra - X

1 Q. The whole point of photogrammetry, the whole point of
2 camera matching, as well, is to use images in order to make
3 estimates of the way things are out in the real world; right?

4 A. I don't know if you said to make statements of where they
5 are. So, yeah, you're determining their position or location
6 of being able to take measurements inside of a photograph.

7 Q. Now, you've testified that you did not correct for lens
8 distortion in the FBI video because -- and why did you not
9 correct for lens distortion in the FBI video? I didn't quite
10 follow your explanation.

11 A. No, it's a good question. I -- we didn't correct for it
12 for two reasons. One, it wasn't information that was readily
13 available to us, so it doesn't exist in a library where we can
14 simply pull it up and easily correct for it; two, after doing
15 the camera matching and finding a good agreement or alignment
16 between the 3D scene and the photographs or video, we found we
17 didn't need to.

18 There's no disagreement in the image that would suggest,
19 like these images you have on the screen, that lens distortion
20 would affect our results.

21 Q. Were you able to measure how much lens distortion was
22 present in the FBI camera?

23 A. I didn't analyze how much the lens distortion was or
24 wasn't -- I mean, honestly, that's not true. I mean, after
25 matching it, we knew that there was no significant amount of

Terpstra - X

1 lens distortion.

2 Q. What kind of camera is mounted in the FBI aircraft?

3 A. I don't know.

4 Q. What kind of lens does it have?

5 A. I don't know.

6 Q. Does it typically exhibit barrel distortion, pincushion
7 distortion, or some combination of both?

8 A. I don't know.

9 Q. Does it have distortion that is nonuniform and isn't
10 somehow perfectly centered around the middle of the image?

11 A. I don't know.

12 Q. Does it have some kind of manufacturing problem with it
13 that every third image distorts the corner of it somehow?

14 A. I don't know.

15 Q. If we could turn to Tab 13, please. This is a paper that
16 you wrote, isn't it?

17 A. I was the co-author, yes.

18 Q. You agree with the statement, "All camera lenses contain
19 optical aberrations as a result of the design and manufacturing
20 process"?

21 A. Yes.

22 Q. "Lens aberrations cause distortion of the resulting image
23 captured on a film or sensor. This distortion is inherent in
24 all lenses."

25 Do you agree with that?

Terpstra - X

1 A. Yes.

2 Q. Do you agree that this is an unavoidable aspect of lens
3 design?

4 A. The manufacturing process? Yes.

5 Q. Do you agree that the degree to which the design and
6 manufacturing process affects the resulting images taken by
7 lens differs not only between different lenses but also for the
8 same lens at different zoom lengths?

9 A. Where you're using a different portion of the lens? I
10 suppose that's true.

11 Q. Do you agree that the amount of such distortion is usually
12 not visually evident? Let me just ask you if you agree with
13 that statement, but I'm going to flip to page 9, as well. All
14 right.

15 A. Sorry. One more time.

16 Q. Do you agree that the amount of such distortion, the lens
17 distortion, is usually not visually evident?

18 A. Yes. If I can clarify on that too?

19 THE COURT: Yeah.

20 THE WITNESS: So, typically, lens distortion, unless
21 it's significant, like the images that we had seen previously
22 in the other figure, where you looked at barrel and pincushion,
23 very prevalent. Right? If it exists in lower amounts, which
24 is more common, it can be difficult to see if you don't have
25 something like a straight line. Like, for instance, if you

Terpstra - X

1 were taking pictures of a building in a cityscape, you would
2 easily see if there's lens distortion because the straight
3 lines and multiple buildings, say, in your photograph would
4 have -- would exhibit some kind of curvature.

5 BY MR. FRANCIS: (Continuing)

6 Q. So as I understand it, then, the example photographs that
7 we were looking at a few minutes ago, those are extreme
8 examples of those types of lens distortion for illustrative
9 purposes?

10 A. Yes. I would say that's true.

11 Q. In the real world, we see that kind of distortion, but in
12 much smaller levels that you can't necessarily spot with the
13 naked eye?

14 A. Yes and no. I mean, they're -- for instance, security or
15 surveillance cameras tend to have very wide angles and what
16 might be considered a fisheye-type of lens simply for their
17 ability to see a wide range all at once, like a -- you would
18 want to do in surveillance. Right? So those are going to
19 typically -- and they're very common and especially from a
20 camera matching or a photogrammetry standpoint.

21 Those are going to exhibit a large amount of lens
22 distortion.

23 Q. Of course. Of course. But usually it's not evident to
24 the naked eye. If we're not dealing with some extreme version
25 of a fisheye lens or a security camera wide-angle lens?

Terpstra - X

1 A. Yeah. So, I guess, just to qualify that, the smaller
2 amounts of lens distortion, when they exist, they're typically
3 not very visible to the naked eye, yes.

4 Q. If we can turn to Tab 1, please.

5 Mr. Terpstra, do you believe that -- this is your report
6 in the case; correct?

7 A. Correct.

8 Q. Do you believe that your report is candid about the
9 strengths and weaknesses of your analysis?

10 A. I hope so, yes.

11 MR. FRANCIS: If we can go to page 16, please. If we
12 can zoom in on the third bullet point in the second block of
13 bullet points there.

14 BY MR. FRANCIS: (Continuing)

15 Q. This is describing your methodology. And it says, "The
16 selected photographs and video frames were then analyzed for
17 lens distortion. Lens distortion was then corrected for in
18 photographs and video frames with known camera characteristics,
19 using PTLens version 9.0 and Adobe Lens Profile Creator version
20 1.0."

21 Did I accurately read that?

22 A. Yes.

23 Q. I have to tell you, Mr. Terpstra, when I read this section
24 of your report, it was not at all obvious to me that what you
25 had actually done here was not correct it for lens distortion

Terpstra - X

1 in the FBI video. Would you agree that it doesn't say that
2 there?

3 A. Well, it doesn't specifically say "FBI video," but those
4 fall into the cameras that we had with unknown camera
5 characteristics.

6 Q. And how would I know that by reading your report?

7 A. That I didn't know the camera characteristics?

8 Q. Yes.

9 A. From reading my report, you probably wouldn't; but you
10 can't get that out of the EXIF data.

11 Q. I understand that now, and I understand that's your
12 testimony now.

13 Of the 12 images that you used for your analysis, you
14 actually only corrected three of them for lens distortion?

15 A. That's correct.

16 Q. The other nine came from the FBI videos?

17 A. Yes.

18 Q. If we can go to Tab 14, please.

19 Isn't it true, sir, that you had studied the impact of
20 lens distortion on the accuracy of camera matching?

21 A. I have.

22 Q. Would you agree that photogrammetry and the accuracy of a
23 photogrammetric solution is reliant on the quality of
24 photographs and the accuracy of pixel location within the
25 photographs? A photograph with lens distortion can create

Terpstra - X

1 inaccuracies within a photogrammetric solution?

2 A. I would.

3 Q. You wrote that last year; right?

4 A. Let's see. Yes. Probably, actually, 2016 it was written,
5 published in '17, so yes.

6 Q. I see that. Yes. Thank you.

7 Would you also agree that camera lenses are curved in
8 nature and introduce varying degrees of distortion in the
9 resulting photographs? This lens distortion has been shown to
10 have an impact on the accuracy of a photogrammetric solution?

11 A. I'm sorry. What was that?

12 Q. Did I read that right from your article?

13 A. Yes.

14 Q. And when it says, "This lens distortion has been shown to
15 have impact on the accuracy of a photogrammetric solution,"
16 there's a footnote there. Footnote 50. Do you know what
17 article this paper that you wrote is citing for the proposition
18 that lens distortion has been shown to impact the accuracy of a
19 photogrammetric solution?

20 A. It looks like there's two different citations there. I'm
21 assuming one of them is another paper. The one that you had
22 pulled up previously. I'm not sure what the second one is
23 offhand.

24 Q. Isn't it true that one of these citations is to another
25 paper that you wrote?

Terpstra - X

1 A. I was a co-author on that paper, but yes.

2 Q. "When not accounted for, lens distortion can create less
3 accurate photogrammetric results."

4 Did I read that correctly?

5 A. Yes.

6 Q. Okay. If we can go to that study that you cite here at
7 Footnote 50, and that's Tab 13. If we can zoom in on the
8 abstract. Would you agree, sir, that the distortion associated
9 with lenses can cause errors to be introduced when
10 photogrammetric techniques are used to analyze photographs of
11 accident scenes to determine position, scale, length, and other
12 characteristics of evidence in a photograph?

13 A. Yes.

14 Q. If we can zoom in on the intro. Would you agree that
15 photogrammetric methods, such as camera matching, rely on the
16 quality of the image being analyzed to accurately measure and
17 place what's in the photograph?

18 A. I'm sorry. Did you read that correctly or is that a
19 question?

20 Q. "Photogrammetric methods, such as photographic
21 rectification and camera matching are used to analyze
22 photographs, and these methods can determine the size, shape,
23 and positions of objects in the photograph."

24 If we can go to the next part. I'm sorry. To the blowup.

25 "However, these methods rely on the image being analyzed

Terpstra - X

1 to accurately measure and place what was in the photograph.
2 And since all camera lenses contain some aberrations
3 or imperfections due to the physical characteristics of the
4 lens, photographic images contain distortion resulting from
5 lens aberrations."

6 So far so good?

7 A. Yes.

8 Q. "In short, these aberrations can shift the location of the
9 image on the pixel matrix and, hence, shift the position size
10 and shape of the geometry that the pixels represent. As a
11 result, when measuring the distorted image, the size, shape,
12 and position, and object of interest may be misrepresented."

13 Did I read that correctly?

14 A. Yes.

15 Q. And isn't it true, sir, that the Coleman experiment
16 studied the impact of lens distortion on camera matching
17 specifically?

18 A. Yeah. It was incorporated in their study, yes.

19 Q. Do you recall seeing that chart a little bit earlier?
20 Maybe we can pull it up on the screen. It's on Tab 2, page 19.

21 A. I recall.

22 MR. FRANCIS: All right. If we can blow up the
23 first -- from the top, down to the middle there, right above
24 the word "rectify." There. Just like that. Thank you.

25 ///

Terpstra - X

1 BY MR. FRANCIS: (Continuing)

2 Q. All right. Do you see here that we have the maximum error
3 from camera matching in two different scenarios? One in which
4 lens distortion was applied and one in which it was not?

5 A. I do.

6 Q. Would you agree with me that the average -- that the
7 average across all of the pieces of evidence, across all four
8 of the photographs, that the average error rate went up by
9 approximately 50 percent?

10 A. I'm sorry. The error rate went up?

11 Q. If -- from -- that when we don't correct for lens
12 distortion the error rate, on average, went from
13 8.6 centimeters up to 12 and a half centimeters on average?

14 A. Yeah. So your question is it went up when lens distortion
15 wasn't removed?

16 Q. Correct. If we don't -- if we don't remove lens
17 distortion, it increases the error?

18 A. Yes. Yes.

19 Q. Just look, if you will, at some of the errors that we're
20 talking about here for particular pieces of evidence.

21 13.9 centimeters, 16.8 centimeters, 18.8 centimeters, 19.6
22 centimeters. I mean, for this image alone, for this
23 photograph, would you agree that the average error of all the
24 objects was over 15 centimeters?

25 A. Yes. Well, all the objects that they were able to measure

Terpstra - X

1 to. It looks like there's some that are not measured.

2 Q. Precisely. All the objects in that photograph.

3 Again, this is for that Coleman experiment that we were
4 talking about earlier that doesn't have blurring and where the
5 camera isn't two miles away?

6 A. Right.

7 Q. Would you agree, sir, that there are other sources of
8 photogrammetric measurement errors associated with
9 photogrammetric processes other than lens distortion?

10 A. Can you -- can error be introduced into the
11 photogrammetric process other than through lens distortion?

12 Q. I'll ask the question again. Would you agree with the
13 following statement --

14 A. Okay.

15 Q. -- "There are other sources of photogrammetric measurement
16 error associated with photogrammetric processes other than lens
17 distortion"?

18 A. Yes.

19 Q. Would you agree that these other errors associated with
20 photogrammetric processes are not fully understood at this
21 point?

22 A. I mean, I think we can understand what -- where they're
23 coming from. Maybe they haven't been quantified or qualified
24 in specific instances, but where the -- where they're coming
25 from can be understood.

Terpstra - X/ReD

1 Q. But not how much they can affect the accuracy of the
2 ultimate result?

3 A. I am -- I know there's been testing done. In fact, this
4 paper itself probably shows some of that testing, but --

5 Q. If we can go to Tab 13, page 9, and if we can zoom in on
6 the final paragraph. "Further studies related" -- I'm sorry.
7 "The analysis presented in this paper demonstrates that
8 eliminating distortion from an image improves the accuracy of
9 the photogrammetric methods. Further studies related to other
10 sources of photogrammetric measurement error would be useful to
11 help understand all errors associated with photogrammetric
12 processes, but this is beyond the scope of this study."

13 Did I read that correctly?

14 A. Yes.

15 MR. FRANCIS: I have no further questions.
16

17 REDIRECT EXAMINATION

18 BY MR. MALONEY:

19 Q. The photos that were depicted in those studies, were those
20 aerial photos or photos taken from the ground?

21 A. They appear to be photos taken from the ground.

22 Q. Would that matter?

23 A. In regards to?

24 Q. A photogrammetric analysis.

25 A. Such as the error that might be achieved or the accuracy

Terpstra - ReD

1 that one can match things with?

2 Q. The accuracy. We'll start there.

3 A. Okay. So the question is does it matter if a photograph
4 was taken from the ground or from the air as it relates to the
5 accuracy of --

6 Q. Of placement of objects in the scene.

7 A. Yes.

8 Q. Can you describe how that -- how that works?

9 A. Sure. It's the angle of incidence. And I don't want to
10 confuse everybody with that word, but it's essentially the idea
11 that -- that I was talking about earlier with an aerial
12 photograph or a photograph taken by somebody standing on the
13 ground. Which one of those would you be able to place a
14 vehicle easier on, right, if I give you -- it's the same
15 vehicle taken from two different vantages. Right? Which one
16 would be easier to place in 3D space or on a diagram? The one
17 on the -- taken from the ground, you could probably achieve a
18 camera match or photogrammetry solution for, but with a single
19 photograph, you could likely move it forward and backward
20 pretty large amounts and still have it look reasonably aligned
21 to the photograph; whereas, when you move to an aerial
22 perspective, you're very much limited. You would not be able
23 to move that vehicle very far at all.

24 Q. I'm a hands-on guy here, Mr. Terpstra.

25 MR. MALONEY: Your Honor, may I move around the court

Terpstra - ReD

1 to demonstrate a point?

2 THE COURT: You sure can.

3 MR. MALONEY: Thank you.

4 BY MR. MALONEY: (Continuing)

5 Q. Three objects on a relatively flat plain, Mr. Terpstra.

6 A. Yes.

7 Q. When you're talking angle of incidence -- I got my phone
8 here and I've got a camera. Angle of incidence, is that
9 referring to taking a photo while I'm relatively close to the
10 ground?

11 A. Yes. I mean, you could talk about the angle of incidence
12 from your camera where it's positioned now, yes.

13 Q. And you're going to get certain information from that
14 picture taken from this vantage point. Yes?

15 A. Yes.

16 Q. And if I want to know where I'm placing these on this flat
17 plain and I'm above them taking my picture, that's a different
18 angle of incidence?

19 A. Yes.

20 Q. And is this -- which one is going to be easier to analyze
21 for -- from an accuracy standpoint in a photogrammetric
22 process?

23 A. So with a known ground surface, it's going to be easier,
24 in the position that you're standing, to understand the
25 location of those objects.

Terpstra - ReD

1 Q. Okay. And the lens type, that matters as well, does it
2 not?

3 A. I'm sorry. The lens type matters?

4 Q. Well, you were cited to a study that talked about
5 telephoto lenses versus normal lenses and wide-angle lenses;
6 correct?

7 A. Okay. The paper you were referring to?

8 Q. Right.

9 A. Okay.

10 Q. So in that world of tele -- what kind of lens were you
11 dealing with here with the FBI cameras?

12 A. Telephoto lens.

13 Q. Can you explain for the Court how the telephoto lens --
14 the physical properties of a telephoto lens and the sensor
15 associated with the telephoto lens can affect lens distortion?

16 A. Sure. I guess the way I would describe lens distortion --
17 so it's radial, meaning that it's -- since the curvature of the
18 lens is typically round, right, it's radial going from the
19 center of the lens out to a corner. And in this case, like the
20 corner of a photograph, you have a round lens. Typically, you
21 have square photographs. So the characteristics that describe
22 the lens -- the amount of lens distortion are going to be
23 defined in a radial matter from the center of the lens to the
24 corner of the lens.

25 When you're dealing with a camera such as this, that -- I

Terpstra - ReD

1 guess what we're describing as, like, a telephoto lens -- one
2 that has a high level of zoom on it, I guess, may be another
3 way of talking about it -- you're going to typically be using a
4 smaller amount of that lens; whereas, wide angle, you're using
5 all of the lens that is cape -- the camera is capable of for
6 that photograph. As you narrow your field of view or you're
7 starting to zoom in on something, you're going to be using a
8 smaller portion of that lens, such as, perhaps, nearly just the
9 center of the lens.

10 Q. Okay. So the way the telephoto lens works is when you
11 zoom in to something, it zooms in and it uses the center
12 portion of the lens to enhance the field of view, to bring it
13 closer or to have the appearance of bringing it closer to the
14 sensor?

15 A. Yes. I mean, lenses are complicated in that they're made
16 of a number of different -- really, there's a number of
17 different lenses inside a camera lens. Right? You've got a
18 lot of different pieces of glass in there. I'm not a lens
19 manufacturer. I don't know exactly how all of them work, but I
20 do know that as you start zooming in on something, you are not
21 using the entire portion of the lens or lenses. You are using
22 more or less, like, the center of the lens more. You're not
23 using the exterior part as you zoom in.

24 Q. Okay. And you were asked about the settling of the truck.

25 MR. MALONEY: Again, Your Honor, I'm going to go

Terpstra - ReD

1 hands-on here. I think Counsel had a great idea of using our
2 box.

3 BY MR. MALONEY: (Continuing)

4 Q. For our purposes, front of the truck. And I'm holding
5 Government's Exhibit 37 away from me. The front of the truck;
6 the back of the truck. Okay?

7 Do you recall -- were you in court today when Deputy
8 Turpen testified?

9 A. Yes.

10 Q. And I kept it straight. That's Turpen testified as the
11 deputy. You're Mr. Terpstra, testifying as the
12 photogrammetrist -- or the camera match 3D expert.

13 Front of the truck; back of the truck. Snow was up to the
14 rails on the passenger's side of the truck; correct?

15 A. Yep.

16 Q. And those doors couldn't be opened from the photographs;
17 correct?

18 A. Yeah. That's my understanding.

19 Q. And, in fact, it -- from the Shawna Cox video, we saw that
20 everybody exited from the driver's side of the car. That was
21 the high side of the vehicle when it came to rest in the
22 snowbank?

23 A. Correct.

24 Q. So everybody gets out the driver's side. Passenger's side
25 is way low in the snow. And your measurement, according to

Terpstra - ReD

1 Counsel, was that this angle at the time, I think .3 seconds
2 before shot "W" was fired, was 14 degrees?

3 A. Correct.

4 Q. Correct?

5 A. Yep.

6 Q. Now, if the truck settled and the door swung open and
7 scraped the snow, as Deputy Turpen described, on the high side,
8 the truck could also be settling at the same rate on the
9 passenger's side. Is that possible?

10 A. Seems possible to me.

11 Q. Okay. And -- or it could be settling at a different rate
12 on one side versus the other?

13 A. Also possible.

14 Q. So if the driver's side is settling at a slower rate than
15 the passenger's side, then the truck would tilt so that the
16 driver's side is up, would it not?

17 A. Yes.

18 Q. And that angle would change, would it not?

19 A. Correct.

20 Q. And you were particularly concerned about the plane that
21 the roof was at at the time; correct?

22 A. Yeah. The plane of the roof, yes.

23 Q. Because that is what you mounted your trajectory rod to --
24 or your trajectory data to and then projected the cone out from
25 there?

Terpstra - ReD

1 A. Right. I -- I would say the roll angle of the vehicle is
2 going to be the same as the roll angle of the roof, but yes.

3 Q. Okay.

4 A. The roof is certainly more important from a measurement
5 standpoint.

6 Q. So to what extent the truck settled, that's an unknown.
7 Is that fair to say?

8 A. I think that's fair to say from the testimony at least.

9 Q. There's some empirical data that the truck settled by the
10 fan made by the snow, but you have no idea to what degree the
11 passenger's side may have settled. The best you have is the
12 photogrammetry solution that you provided from those 12
13 different camera perspectives. Was that one of your goals in
14 this process?

15 A. I think that is the best data.

16 I'm sorry. Was what one of my goals?

17 Q. To get the best data for that truck before it settled.

18 A. Yeah. As we go back to previous conversations where we're
19 selecting photographs or video frames, yes, I was under the
20 understanding that it would, you know, make more sense to
21 choose photographs or video frames nearest to the time of shot
22 five. Nearest to the time of the incident, yes.

23 Q. So let's get to the time of shot five.

24 MR. MALONEY: Could you -- would you mind bringing up
25 the video that you played earlier in cross-examination from the

Terpstra - ReD

1 Cox video and the FBI video? Perfect. Stop right there. Can
2 you back that up nine frames, please.

3 THE COURT: I want the audio that goes with that.

4 MS. OAKLEY: You can't reverse frames. You can only
5 go forward frames.

6 MR. MALONEY: Can you display the video right before
7 the truck comes into the snow, please. And can you play it at
8 normal speed.

9 MS. OAKLEY: I'm attempting.

10 MR. MALONEY: Oh, okay.

11 (Video played.)

12 BY MR. MALONEY: (Continuing)

13 Q. Now, in that scene, the truck comes in and the left wheels
14 are higher than the right wheels; correct?

15 A. Yes.

16 Q. And then the truck comes down and comes to rest. Is that
17 visible in that scene?

18 A. Yeah, I believe so. You're saying is there dynamic roll
19 visible in the video as it comes to rest?

20 Q. Right. At the point after Mr. Finicum gets out of the
21 driver's side of the truck, the FBI aerial footage is on the
22 inside -- is focused on that truck. You can clearly see it,
23 correct, can you not?

24 A. Yeah. When -- when he comes out, yes, you can see the
25 truck.

Terpstra - ReD

1 Q. Did you see any obvious signs of the truck shifting or
2 settling after the point at which Mr. Finicum got out of the
3 truck?

4 A. No.

5 Q. And the camera match photogrammetry solutions -- or the
6 photographs that you chose from the aerial videos in the camera
7 match photogrammetry solution, were those from daytime or
8 nighttime?

9 A. They're all daytime.

10 Q. And this took place at approximately 4:34, I believe was
11 your testimony, or I think that was Counsel's representation to
12 you.

13 A. That sounds correct.

14 Q. And approximately in this video, how long does it stay
15 daylight?

16 A. I'm not sure how long it was daylight.

17 Q. About 20 minutes?

18 A. I've heard that.

19 Q. And the other photographs that you used, the cell phone
20 photographs that you solve for lens distortion on, were those
21 daylight photographs or nighttime photographs?

22 A. Daytime photographs; daytime video.

23 Q. And the photographs taken that showed vehicles settling,
24 were those daytime photographs or nighttime photographs?

25 A. The one that I saw earlier with Mr. Turpen's testimony, I

Terpstra - ReD

1 believe it was a nighttime photograph.

2 MR. MALONEY: And can you rewind back to the point
3 where the truck is about to enter the snowbank. Thank you.

4 Can you walk that forward now frame by frame, please.

5 (Video playing.)

6 MR. MALONEY: Is this playing correctly?

7 (Video playing.)

8 BY MR. MALONEY: (Continuing)

9 Q. Now, as the truck comes into the snowbank, the FBI
10 surveillance plane loses tracking on the scene; correct?

11 A. Yes. Yes.

12 Q. And that's shortly after one of the agents is nearly
13 struck by the truck as the truck enters the snowbank?

14 A. Yes. I believe that's shortly after.

15 (Video played.)

16 BY MR. MALONEY: (Continuing)

17 Q. But from here on in, there are -- from this point of the
18 video on in, there are points in time in each frame that you
19 could analyze; correct?

20 A. Yes.

21 Q. And could you analyze each of those and place what you've
22 referred to as the bipeds in the positions that they are at
23 each frame?

24 A. Yes. I would say each frame that visible photogrammetric
25 analysis or camera matching photogrammetry can be done to

Terpstra - ReD

1 position the -- the bipeds or the character models such that
2 they represent their positions in the video.

3 Q. And you can do that for each frame in your model?

4 A. Yeah. Using the model.

5 Q. And if you did that, could you play them in sequence so
6 that they would animate and play just like we're seeing in this
7 video?

8 A. So that the -- the models would animate on top of the
9 video?

10 Q. Yes.

11 A. Yes.

12 Q. Would that be one way to address this issue of .3 seconds
13 before shot five, after shot five, and the relative positions
14 of the individuals in the scene?

15 A. Yes. Such that our current position, nine frames previous
16 to now, shot five, and then our subsequent frame that we've
17 matched as 26 frames after shot five. Now, yeah, if we were to
18 match in between those, it would encompass, yeah, all the
19 moving from there.

20 Q. And would that also encompass what Mr. Piazza talked about
21 in terms of his estimated range of certainty of his
22 synchronization?

23 A. I'm not aware of what Mr. Piazza testified to as his range
24 of certainty.

25 Q. So you were told on cross-examination that he estimated

Terpstra - ReD

1 plus or minus 11 frames. So if you animated 22 frames around
2 the time of shot five, you would have a 3D representation of
3 what occurred on that scene at shot five?

4 A. Yeah. I believe that's true.

5 Q. Would you like an opportunity to do that, sir?

6 A. Certainly.

7 Q. And would you like an opportunity to correct this error
8 that we first talked about when you -- when you took the stand
9 about the .3 seconds before shot five?

10 A. Yes. Absolutely.

11 Q. You were shown the Coleman study in your
12 cross-examination. Do you agree with the approach taken on the
13 Coleman study?

14 A. In general, the approach?

15 Q. Yes.

16 A. In general.

17 Q. Do you believe that all aspects of that approach would be
18 appropriate in the unique circumstances in this case?

19 A. No.

20 Q. Does that study use aerial photos for any part of the
21 photogrammetry solutions that it uses?

22 A. No.

23 Q. Do you know if it used manual or automatic photogrammetry?

24 A. I believe they're using camera matching photogrammetry as
25 well as analytical photogrammetry in terms of software.

Terpstra - ReD

1 PhotoModeler, I believe, is one of their software titles they
2 use to compare to.

3 Q. Did you use those automatic photogrammetry solutions in
4 this case?

5 A. No.

6 Q. Why not?

7 A. Well, we -- I've certainly looked into using those over
8 the course. We own PhotoModeler software, in fact, but we
9 typically don't utilize them for a couple of different reasons.
10 One, we've had experiences where we've received false positives
11 from that software, such that it would say that we have a low
12 root-mean-square error or the analytical software would suggest
13 that we have an acceptable range of error, but, visibly, it was
14 clear that that wasn't true. And then the -- another reason
15 that we typically don't use it is it just doesn't fit well into
16 our process, for instance, when we are working in the same
17 software what we're creating visualization materials and
18 analyzing photographs, and it's very convenient for us from a
19 streamline standpoint.

20 MR. MALONEY: Thank you, sir. Those are all the
21 questions I have.

22 Thank you, Your Honor.

23 THE COURT: Anything further?

24 MR. FRANCIS: Very briefly. Is the microphone
25 picking me up?

Terpstra - ReX

1 THE COURT: Yes. Thank you.

2

3 RECROSS-EXAMINATION

4 BY MR. FRANCIS:

5 Q. Mr. Terpstra, if you were to do what Mr. Maloney is
6 suggesting and analyze all 23 of these possible frames, figure
7 out where everyone and everything was in each of those frames,
8 animate it, I guess, that's a new analysis; right?

9 A. I -- I mean, I guess I would say if I was to do that, it
10 would expand on the current analysis I've done in the case.

11 Q. You haven't done that yet. You have to go out and do
12 that?

13 A. Correct. That work has not been completed.

14 Q. Presumably, you would have to come back and write a new
15 report for us?

16 A. You know, I would love the opportunity to submit a
17 supplemental report with the new -- my understanding of now
18 what Mr. Piazza -- where he had synced the video, because I had
19 used one that I thought was the correct sync, and it wasn't.

20 MR. FRANCIS: Thank you very much, Mr. Terpstra. I
21 have no further questions.

22 THE WITNESS: Thank you.

23 THE COURT: You may step down.

24 Tell me what you have in mind for tomorrow.

25 MR. FRANCIS: Your Honor, may I -- may I move certain

1 exhibits into evidence first, before we deal with the logistics
2 for tomorrow?

3 THE COURT: That's fine. Have a seat, please.

4 MR. FRANCIS: Certainly. Your Honor, we move the
5 admission of Exhibits 8-01, 8-02, 8-04 --

6 THE COURT: You're excused.

7 THE WITNESS: I'm sorry.

8 MR. FRANCIS: -- 8-05, 8-07, 8-08, 8-09, 8-10, 8-11,
9 8-12, 8-13, 8-14, 8-24, and 8-23, which is a video that I
10 believe is already into evidence from Mr. Piazza.

11 THE COURT: They're all admitted. Thank you.

12 MR. FRANCIS: Thank you very much, Your Honor.

13 THE COURT: Who wants to speak for tomorrow?

14 MR. FRANCIS: Your Honor, my understanding is that
15 Professor Smith is testifying next.

16 MR. MALONEY: That's correct, Your Honor.

17 THE COURT: Okay.

18 MR. FRANCIS: Following Mr. Smith's testimony, there
19 will be testimony from Mr. Eugene Liscio and
20 Mr. Clifford Mugnier.

21 THE COURT: That will take some time.

22 MR. FRANCIS: Yes, sir.

23 THE COURT: Tell me about Mr. Smith.

24 MR. MALONEY: Counsel and I had an opportunity to
25 confer about Mr. Smith. I think probably an hour for him,

1 Your Honor.

2 THE COURT: What is he going to say?

3 MR. MALONEY: He's going to testify about his review
4 of the various expert work on this case, Your Honor.

5 THE COURT: What is that going to add?

6 MR. MALONEY: I think we've referred to it in our --
7 in our brief, and we've referred to it in our argument or our
8 questioning of witnesses in this case, but he did review the --
9 the criticisms of the government expert witnesses. He also
10 reviewed the procedures and methodologies of the -- of the
11 government witnesses and found them to be reliable.

12 THE COURT: You think it would be best to have him
13 tomorrow or until we hear the other two experts?

14 MR. MALONEY: I think he has a plane to catch
15 tomorrow.

16 THE COURT: Oh, not another airplane. Yesterday was
17 a -- one thing I'm not is prescient. I can't predict what in
18 the world is going to happen, what it's going to do, what -- is
19 Mr. Smith here?

20 MR. MALONEY: He is, Your Honor.

21 THE COURT: Where? Stand up.

22 Come around. Tell me what -- where are you from and where
23 are you heading?

24 PROFESSOR SMITH: Denver, Colorado.

25 THE COURT: Where?

1 PROFESSOR SMITH: Denver, Colorado.

2 THE COURT: Okay. And so when are you due out?

3 PROFESSOR SMITH: 2:00. So I have tomorrow morning I
4 could testify.

5 THE COURT: Okay.

6 PROFESSOR SMITH: I would be happy to change my
7 flight if it pleases the Court.

8 THE COURT: No. That will be fine. Unless you want
9 him to.

10 MR. MALONEY: We're happy to discuss that -- those
11 options with Mr. Smith. I'm cognizant of his schedule.

12 THE COURT: It doesn't make any difference to me.
13 You're the advocates, and anything that you want to do, I'll
14 just go with the flow.

15 MR. MALONEY: I -- I think we're -- we're ready to
16 break for the day, if that pleases the Court.

17 THE COURT: Oh, I know that. I don't know -- you may
18 keep going. I won't be here.

19 All right. I'll see you all at 9:00 in the morning.
20 Whatever you want to do is fine.

21 PROFESSOR SMITH: Thank you, Your Honor.

22 MR. MALONEY: Okay. Thank you.

23 (Hearing adjourned.)

24

25

C E R T I F I C A T E

United States of America v. W. Joseph Astarita

3:17-cr-00226-JO

EVIDENTIARY HEARING

May 23, 2018

I certify, by signing below, that the foregoing is a true and correct transcript of the record, taken by stenographic means, of the proceedings in the above-entitled cause. A transcript without an original signature, conformed signature, or digitally signed signature is not certified.

/s/Jill L. Jessup, CSR, RMR, RDR, CRR, CRC

Official Court Reporter
Oregon CSR No. 98-0346

Signature Date: 6/11/18
CSR Expiration Date: 9/30/20